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Mechanical Goods

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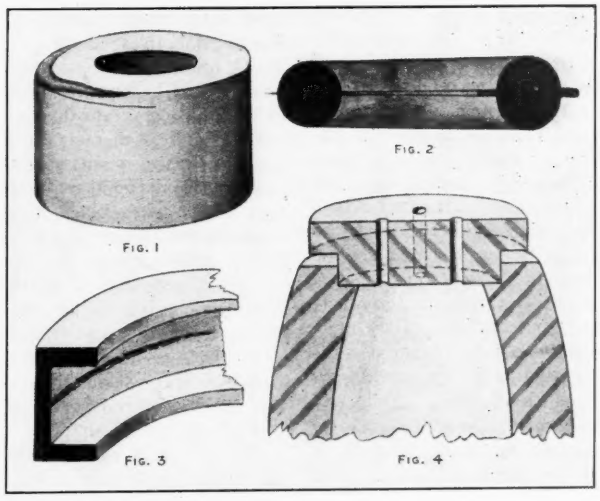
THE title[1] of this short paper has been taken by the author to imply a consideration of those faults which constitute a defect in the molding or vulcanizing process, and in considering these various defects, it will be assumed that the quality or mix of the compound is correct, and that the "cure" is also correct.

Bearing in mind these reservations, the chief difficulties in the production of rubber articles, described in workshop language, are as follows: (1) Not up or shy; (2) too full; (3) crippling; (4) trapped air; (5) surface markings; (6) porosity.



Trans. Inst. Rubber Ind.

Rubber, like every other known material, expands on being heated, and as the rate of expansion is considerably greater than that of the metal mold containing the rubber, any excess of material has to find a way out either by lifting the mold apart or through the channels or spaces provided.

A comparison between the ratio of expansion or the coefficient of linear expansion of a 50 per cent rubber compound and metal can be illustrated by imagining a steel and a rubber rail each 60 feet long, and both heated to the temperature of boiling water. The steel rail will lengthen by approximately 7/8 of an inch; while the rubber rail will increase in length by no less than 8¾ inches.

That is why rubber molds have to be made of sound substantial metal and due regard must be given in the design to provide for this expansive force of the rubber compound.

During the vulcanizing process the specific gravity of the material alters with the progressive cure. As vulcanization proceeds, the density of the compound formed exceeds the mean density of the constituents of the mixture; and this process of volumetic change is what we know as "shrinkage," and must be allowed for in the shape of the mold, by its being made a certain amount larger than the desired finished article.

It is, of course, taken as established that the dimensions of every mold, whether of the "single" or the "nest" type, must be carefully checked before being put into commission. Proper allowance must also have been made for the "shrinkage" of that particular quality or mix of rubber from which the desired article is to be made. Many of the rejections for dimensional errors, especially with articles of precision, requiring close limits, are due to slight variations in mold sizes.

1. NOT UP OR SHY. The first example selected (Figure 1) is perhaps the least troublesome fault that is met with in the production of mechanical goods. It is, therefore, surprising how frequently one sees this defect in rubber goods, not only exposed for sale in shops where nothing over 6 pence is the limiting price, but as component parts of really good class mechanical appliances.

The fault consists of an imperfect formation of the desired contour or outline of the article, by the omission of some portion of the material from the finished shape. In other words the contents or space enclosed by the mold, has not been completely occupied by the material.

Insufficient weight was put into the mold by the operative.

2. TOO FULL. The second fault is the converse of the first and does not require describing (Figure 2), as here again the cause is apparent, and the remedy clear. Many foremen and chargemen are inclined to err on the side of excess weight to safeguard themselves from rejects. It must

[1] "Difficulties in the Manufacture of Mechanical Goods." Read before the West of England Section, Institution of the Rubber Industry, on Jan. 7, 1931. Published in *Trans. Inst. Rubber Ind.*, Feb. 5, 1931, pp. 453-57.

not be forgotten that surplus weight means loss of valuable material, and a very careful watch must be kept that the correct weight is put into the mold.

Too much material will cause the mold to "spring" or open during vulcanization. It is very important that strict attention should be paid to the requisite weight of each article prepared for the vulcanizing process in the mold, especially in the case of articles which have to comply with very close limits of dimensions.

3. CRIPPLING. This is the next fault to consider (Figure 3), and it is the most troublesome to surmount.

It consists of the malformation of the article during vulcanization; it is something more than the other two faults although it can be produced by the same cause: either too little or too much material put into the mold. It occurs particularly with goods of uneven section, especially where there is a sudden change of thickness of the section and the article has acute angles and is of irregular shape.

The difficulty of successful molding is intensified when the article contains embedded canvas or metal parts. The illustration is a sectional view of a rubber ring sometimes used for the packing of glands or as a washer or gasket for securing the tightness of air, water or steam pipe joints.

The fault of "crippling" is indicated as occurring in the web or middle portion of the ring, but it need not necessarily take place at this particular point. A distinct aid to overcoming the difficulty is a careful building up of the uncured article to approximately the finished shape; in some cases it may be necessary to cold press the article before curing.

4. TRAPPED AIR. Probably this defect and the next, "surface markings," are the most aggravating of all faults.

The defect consists of a "shyness" or lack of the full impression of the outline of the mold, giving the vulcanized article a somewhat similar appearance to that of the first fault mentioned, that is "not up" or "shy." It often occurs in unexpected positions on the article and the cause is obscure, but the chief reasons are badly designed molds, improper dressings, and dirty molds.

Trapped air can be reduced if proper venting is provided; the vents allowing the imprisoned air to escape. Care must be taken that the openings are not too large, otherwise the rubber itself will be extruded and produce a "fin" or "flash," which will spoil the appearance of the finished article and also produce porosity in the rubber.

A successful example of overcoming this difficulty is shown in Figure 4 (conical buffer mold indicating holes drilled in flangs and top).

5. SURFACE MARKINGS. The defect known as "surface markings," or "denting," in the manufacture of mechanical rubber goods consists in the formation of identations, that is, flattened depressions on the surface of the cured article, in fact, any of those irregular shaped blemishes which more from their appearance than anything else constitute a defect.

It occurs chiefly where the material is vulcanized in molds with a plain flat surface, but it is also the cause of many rejections of articles of rounded and circular section.

The pretty engraved patterns seen on some molded hot water bottles are a definite aid to the manufacturer in reducing the number of rejects; the pattern hiding or masking those small blemishes which would otherwise be readily shown up by a flat polished surface.

There are probably many circumstances which may contribute towards the formation of these surface markings. A condition which one might expect to facilitate this fault is the "suction" effect produced by the too highly polished surface of the mold.

A help towards overcoming this defect is in a correctly designed mold which provides proper venting, and a study of a suitable mold dressing. The object of the dressing is to provide a surface to the mold which will allow the rubber during the earlier stages of vulcanization, to "slip" or "slide" on the surface. The dressing should act as a lubricant in much the same way as oil does in bearings; the film affords for the air a passage out to the vent.

Secrecy is often maintained of the kind and composition of the mold dressing. All sorts of weird recipes have been used. French chalk, graphite, sugar and water, soap, casein, oil, glycerine, are all used with more or less satisfactory results, but effective remedy will be more in the direction of a study in mold design than in these mold dressings.

Some manufacturers endeavor to surmount this difficulty by shrinking the material either in the form of sheet or tube stock, or the raw built-up article. The shrinking process consists of subjecting the material to the temperature of boiling water. This relieves the strain which has been produced by the calendering or tubing process, and which causes uneven contraction of the rubber during vulcanization.

The effect of calendering mixed raw rubber is to produce what is known as "calender grain." This may be of two kinds—(1) fugitive or temporary and (2) permanent.

The former results in the presence of strains in the cooled calendered sheet, and when the latter is subsequently warmed, the rubber in its endeavor to establish a neutral or unstrained condition, tends to alter its position and shape.

"Permanent grain" effects are also produced in the calender or forcing machine, and these are due to the alinement of the mineral particles of the mixing in certain definite directions. In sheet this is parallel to the length of the sheet; in forced rod or tubing the direction of alinement is usually spiral along the rod or tube.

This type of grain does not suffer much alteration during molding unless there is considerable movement in the mold such as occurs when a piece of sheet rubber is forced by pressure into a mold of intricate contour. In the redistribution which takes place in these cases, there seems to be a tendency for the grain effects to occur in a direction parallel to the mold surface.

The distribution of grain in molded articles may be of considerable importance as it can affect the resistance to abrasion, cutting, and fracture along certain planes.

In the case of articles made from sheet and subsequently cured in open steam, it is of importance, before making up the articles, to relieve the strained condition; otherwise the articles go out of shape.

In the case of molded goods this precaution is not usually neccessary, especially if the mold is full.

6. POROSITY, the last fault, consists of the formation of minute cells generally of circular shape; these pores are so small as to be only seen under a magnifying glass.

It is necessary to make a distinction between surface porosity and internal porosity. Both forms are met with in soft rubber articles, as well as in vulcanite. Rubber articles cured in direct steam, with no precaution taken to prevent the water of condensation falling on their surface, show signs of external porosity.

Internal porosity cannot be detected by a visual examination of the outside surface. An externally perfectly molded article, when cut and dissected will sometimes be found to have a center core consisting of small interstices.

The usual cause is lack of pressure due to the escape of the material through venting or the accidental opening of the mold during vulcanization. The same effect will be produced by incomplete filling of the mold.

Articles made from extruded material are more liable to have this fault than when made from calendered sheet, owing to the churning of minute air cells into the plastic stock while in the forcing machine. The way to prevent porosity is not to overmill the stock, and to cure in well filled molds and under high pressure in a press, or securely bonded molds.

Rubber Problems Confronting Automotive Engineers

R. K. Lee[1]

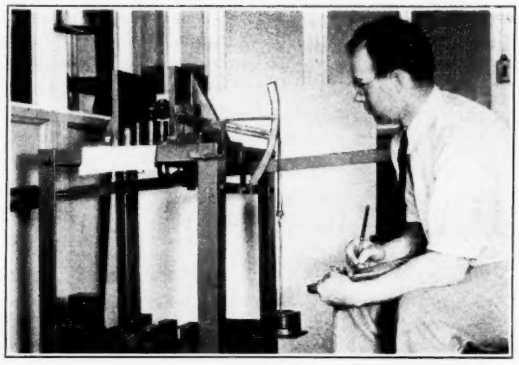


Fig. 1. Fixtures for Measuring Radial and Endwise Deflections of Rubber Bushings

THE utilization of rubber in automotive engineering has become so extensive and essential for durability and smooth functioning of the automobile as a whole that the author of the paper, here condensed, finds that this material should receive special study from an engineering point of view and that problems of design and specification of rubber parts should be analyzed similarly to those of other components of the car. Lack of space prohibits giving the paper in full. The following paragraphs, however, disclose its principal engineering features.

The Chrysler Corp. uses in its cars over 650 different rubber parts and 88 different rubber specifications. In the Chrysler 8 Sedan there are 270 individual rubber parts weighing, in total, 141 pounds or 3.8 per cent of the full weight of the car. Approximately 8 per cent of the total cost of the car is in rubber.

Engineering Problems

In the case of rubber parts there is no precedent of design and quality to guide the engineer such as have been established in the case of metal parts; therefore the rubber engineering laboratory became a necessity.

Through contacts with the rubber companies and tests run in the laboratory, it was found that the rubber stocks being used in the car ranged from 500 to 5,000 pounds per square inch tensile strength, 200 to 800 per cent elongation, 1.1 to 5 specific gravity, 2 to 70 per cent crude rubber, and from 8 to 80 cents per pound. The problem, then, is to choose the right compound for a specific place.

The following list of conditions is important in connection with this choice of rubber qualities or stocks: Temperatures and fixed compression-loads; abrasion; mechanical deflection or deformation; proportions between movement and volume; appearance or finish; chemical reactions on rubber and of rubber on other parts; manufacturing procedure; dimensional variations; change of physical properties due to aging.

Cold Flow of Rubber

The demand for certain parts made of rubber to maintain their original shape, when subjected to pressure and temperature, led to the study of their flow under these conditions.

This phenomenon relates to permanent set, but since this term is usually associated with the tensile and elongation permanent deformations, the term "cold flow" or briefly "flow" was selected to indicate compression flow.

As the mere specification of high quality does not assure good non-cold-flow properties, it is necessary that the laboratory have some means to evaluate cold flow. The following test[2] seems to answer this problem very well. By means of a spring pressure device which is self-contained and may be placed in the aging oven, a disk of rubber ¼-in. thick and ¾-in. in diameter is subjected to a pressure of 600 lb. per sq. in. at a temperature of 158° F. for 24 hr., the percentage of cold flow being the change in thickness divided by the original thickness. To give an idea of the amount of permanent set or cold flow and the change in extent of set brought about by this investigation, when this test was first started at the Chrysler laboratory four years ago, it was not possible to get more than one or two of the rubber companies consistently to submit samples of rub-

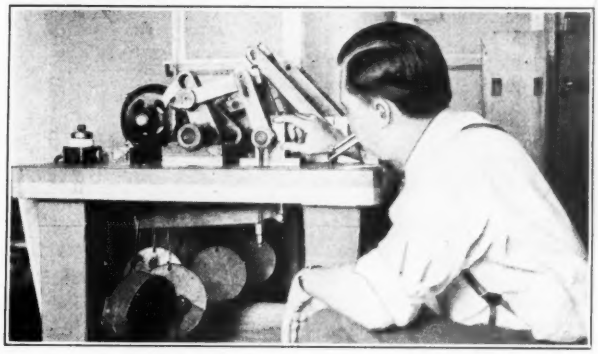


Fig. 2. Making Life Tests on Bushings

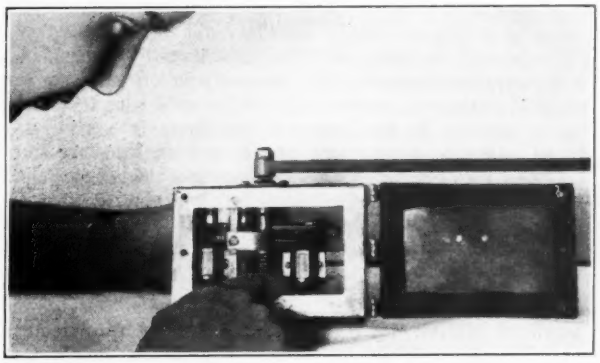


Fig. 3. Shackle Angle Indicator for Measuring Work Done by Shackle Per Mile

[1]Director of research, Chrysler Corp., Detroit, Mich. Paper presented at the Annual Meeting, S. A. E., at Detroit, Mich., on Jan. 19-23, 1931. Publication permitted by *S. A. E. Journal.*

[2]Originated by C. Bockius, manager, Automotive Dept., Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Detroit, Mich.

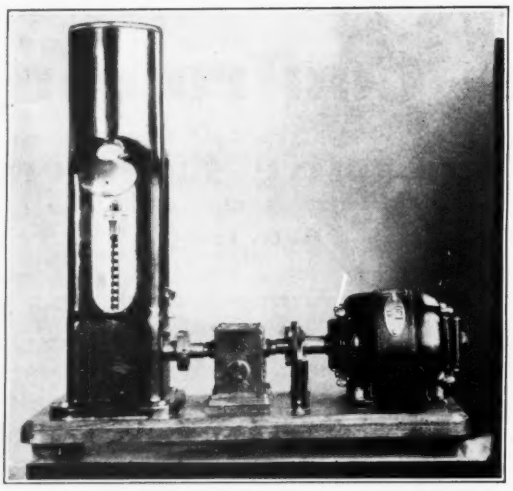


Fig. 4. Rubber Tensile Strength Test Machine for Use in Cold Room

ber under 20 per cent. Today a number of companies can supply rubber which will run under 6 per cent cold flow.

When the pressures on rubber of a specified quality are kept below 25 lb. per sq. in. and the temperature below 158° F., the part being free from the action of oil or other destructive chemicals, the rubber will have a tensile strength of 2,000 to 2,500 lb. per sq. in., hardness from 40 to 60 Durometer, and a cold-flow of 15 to 20 per cent, to hold its dimensions within close limits over a period of three to four years.

When these conditions of temperature and pressure are exceeded, a much better grade of rubber should be used, and each problem analyzed separately and carefully. The physical properties which should guide the choice of stocks in these cases include tensile strength, elongation, cold flow, hardness, aging due to heat and ultra-violet rays, modulus, and permanent set in elongation.

Some rubber companies doubt the necessity of high-tensile specification on compression stocks; however, specifying a tensile strength of more than 3,000 lb. per sq. in. usually assures a much better grade of stock, containing a higher percentage of new rubber than if 2,000 pounds or less is specified. This does not mean that some of the compounds containing reclaimed rubber are not good stocks. This is illustrated by the fact that with rubber at 10 cents and less per pound all of the rubber companies continue the use of reclaims which cost as much as new rubber and get a quality that it is impossible to duplicate in stocks using 100 per cent of new rubber.

Abrasion

Parts such as mats and step pads should be considered with respect to abrasion. The most satisfactory abrasion test of such goods is to compare the condition of samples placed on a stairway in the factory where there is considerable travel. Designs having an irregular embossed surface show the effect for abrasion, for the same volume of material worn from the mat, much sooner than the plain regular strip design.

Deflection under Compression

If a part must be subjected in service to continued deformation, extreme care should be taken to prevent localized strains. Also localized abrasions are frequent and harmful. A set-up should be made to approximate actual conditions and, if possible, to interpret car-miles into deflections. Load-deflection curves should be made before and after test, since rubber may have a localized fatigue-failure, yet, from outward appearance, still be in good condition. These failures usually show up in the load-deflection curves. It is unsatisfactory to deflect rubber over 100 per cent elongation in continuous tests or applications. When deflections exceed 100 per minute, there is considerable chance of internal heat causing trouble.

An example of the result of continued deflection of rubber under compression is the silent-bloc spring-shackle. At first this bushing would not deliver more than 5,000 miles on test cars without replacing bushings. The unit pressures on the bushings were extremely high and the deflections out

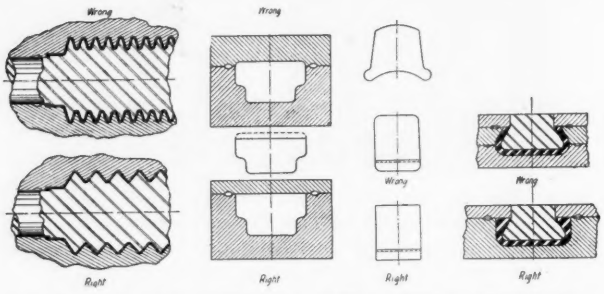


Fig. 5. Examples of Right and Wrong Ways of Designing Rubber Boots, Bumpers, and Similar Molded Parts

of proportion to the volume of rubber used. As soon as these properties were corrected, it was impossible under ordinary circumstances to wear out the bushing in the life of the car. The laboratory equipment in this case consisted of deflection-measuring equipment and oscillating equipment, shown in Figures 1, 2, and 3, in which it was possible to vary the load and deflection on each bushing.

An interesting interpretation of oscillations into car-miles was made possible by the indicator shown at the lower right in Figure 3. The body of the instrument is attached to the frame of the car over the axle and the arm is joined to the axle through a swivel joint. Three indicators are geared to the pivot of the arm in such a way as to record the total angular movement of the arm, which may be translated into shackle movement, in one indicator, each oscillation in another, and all over a selected angle on the other indicator.

Thus it was possible to go out on various roads in any car and actually measure over a distance of miles the exact work the shackle must stand.

Modulus Specified by Deflection Rate

As it is possible in rubber parts to have the correct hardness, tensile strength, and other physical properties and still have a different deflection rate due to a change in modulus, it is sometimes necessary to specify modulus. This may be done in some cases by specifying a definite limit of deflection rate, in pounds per inch of deflection. Where an engine-mounting build-up rate determines a torque period, a special test-fixture is made for production which will weigh, with respect to deflection rate, each mounting or a definite percentage of the production parts.

In cases of this kind the rubber company must be instructed to watch the curing time more carefully than in standard practice and, if the part is extremely critical, the vendor should make a similar test fixture in his plant and watch the control from day to day, since the variation in climatic conditions is sufficient to change the modulus and cold flow properties more than the specified limits.

Shrinkage sometimes gives the same effect as a change

in modulus, especially where rubber is bonded to metal. This is because, if the rubber is confined to a fixed volume in curing, the shrinkage of the rubber places it under a tension which will change the build-up rate of the mounting. To avoid this difficulty clearance is left between the metal parts, when in the mold, according to the volume of rubber involved and, when cooled, the rubber can be restored to a normal condition by taking up this clearance.

A special automatic stress-strain tensile machine to make an accurate survey of change in modulus was designed to study the characteristics of deflection in the same machine under various conditions of temperature. This machine, Figure 4, can be taken into an ice box or cold room, plugged into the light switch circuit, and the indicators of the machine can be observed from the outside through glass windows throughout the complete tensile cycle.

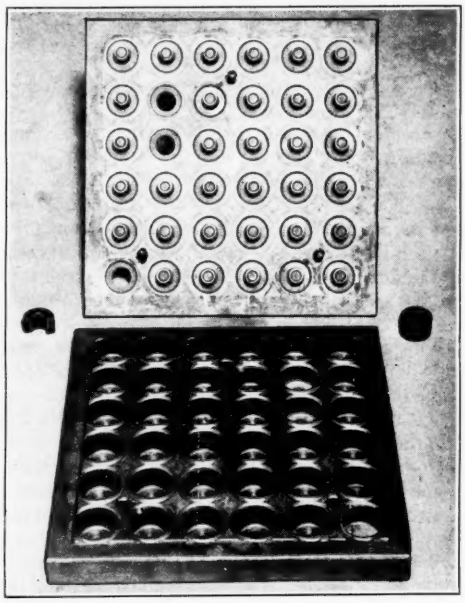


Fig. 6. Mold for Ferrules with Radii at Their Ends

The sample is placed in the tensile jaws, which are adapted to be separated by means of an electric motor through a gear reduction; the tensile pull is registered on a calibrated spring in the head of the machine.

Proportions Between Movements and Volumes

Where rubber is relied upon to give a certain deflection rate, the proportions between amplitude of movement, pounds per square inch of load, and volumes of rubber are very important. This problem arises in the designing of engine mountings to have the same deflection rate for engines of different weights. It is advisable to proportion thickness or volume of rubber almost entirely according to the vibration amplitudes of the engine and the area in tension according to the weight of the engine. Many other factors, such as frame rigidity and engine bounce, enter into this problem, making impossible the laying down of any fixed rules for proportions.

When designing rubber parts it is important to remember that a cavity must be cut the reverse of the piece to be made, and that the operator must be able to assemble and take apart the mold many times a day, taking the rubber part from it while it is at a temperature of about 300° F., and that whatever thickness and outside dimensions the part has, the mold must be enough larger than the piece to assure mold strength and contact surface with the press.

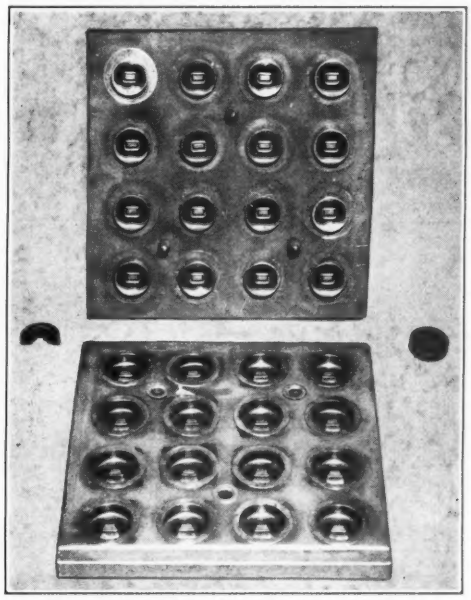


Fig. 7. Mold with Engraved Cavities

Metal inserts, when used, must be completely inclosed in the mold so that the heat will penetrate into the metal as well as the rubber. In metal-insert work, especially where a good bond to the metal is required, it is necessary to design the parts so that there is no flowing of the rubber over the surface of the metal parts. For some reason this flowing of rubber greatly weakens the bond, especially in using brass-plating. Where possible, it is desirable to locate the metal parts by having direct metal contact with parts of the mold and, in the case of round flat parts such as vibration-damper parts, rubber thickness is maintained by permitting the top plate either to rest on the bottom of the mold cavity or on locating lugs of the mold.

Owing to variations in stampings and in mold cavities, it is desirable to locate the stampings from holes in the stamping, leaving about $\frac{1}{16}$-in. clearance completely around the part for clearance in the mold so that the part can be extracted from the mold easily. All of the time the mold is out of the press it is cooling off; consequently, since the heat must flow from the press to the mold, this loss of temperature means dollars in B.t.u.'s lost in cooling and variation in cures. When the parts are hard to remove from the mold and there are a number of cavities in the mold, much lost time and high unit-cost result.

Examples of Rubber Molds

In making boots for hydraulic-brake systems, it is very easy to design around some of these troubles. At the left in Figure 5, the top drawing shows a bellows-type boot which would be very hard to strip from the mold pin because of the steepness of the convolutions. Below is a drawing of one that would be much easier to make and which would actually work better in the braking system.

Good illustrations of the desirable thing to do on bumpers and similar molded parts are shown in the two middle sketches in Figure 5. The mere addition of a radius to the lower portion of the bumper (upper sketch) makes it necessary to machine a cavity in a top plate; whereas, if this radius can be eliminated, a perfectly flat plate may be used to cover the mold, as below.

Another part, which may be designed in two ways with-

(*Continued on page* 64)

Oil, Acid, and Steam Hose

Manhattan Rubber Mfg. Co.

Fig. 1. Oil Tanker Being Loaded Through Deep Sea Hose

Special Constructions for Different Service – Oil Resisting Hose–Special Hose for Chemicals – Working Pressures of Steam Hose – Heat of Steam

HOSE for every service is, of course, often seriously damaged through mechanical abuse such as injury to the tube by coupling, kinking, and crushing, bursting as the result of excessive pressure, and damage by misapplication to uses for which it was not designed. Failure due to these causes is not chargeable to materials or workmanship. The user of hose has ample choice among the types and grades available to select those adapted to the requirements of special service.

Among the great variety of materials conducted through hose none are more actively destructive to the rubber than mineral acids, strong alkalies, solvent liquids, oils in general, and steam. These materials differ widely in their attack upon rubber, therefore, each offers its special problem.

Oils of every sort and rubber solvent liquids penetrate rubber more or less readily causing it to swell, become soft, and reduce its tensile properties until in the case of a hose, the article is useless for service.

Not only do the different classes of oils vary in destructive influence on rubber but individual oils of the same class differ considerably. Because of this it is impracticable to compound satisfactory oil hose unless the actual oil to be handled is named and the service conditions specified.

Similar individual specifications are requisite for success in making hose for conducting steam, acids, alkalies, and other active chemical materials that deteriorate the quality of rubber.

Oil Resistance

Rubber is made resistant to oils by employing the highest quality of rubber and curing it tightly with sulphur and an ultra accelerator that will cure the rubber to its full tensile properties. Good oil resistant rubber has a high coefficient of vulcanization. In other words the ratio of combined sulphur to the rubber should be high. Undercured rubber is never oil resistant. In compounded tubes the percentage of rubber will be regulated for the desired flexibility without the use of reclaimed rubber or any softening ingredient. Glue is admissible as an oil resistant.

Oil Hose

While hose for conducting oils and solvents of all sorts must resist softening and swelling, other contingencies must be provided against by compounding. This is indicated in a few examples that follow.

Rubber coming in contact with edible oils or emulsions should contain nothing that can impart odor, color, or produce toxic effect to the materials handled. The discoloration of water white and pale amber oil products, gasoline, etc., must be guarded against by excluding from the rubber dark oil soluble softeners, reclaimed rubber, accelerators, and antioxidants that darken in sunlight, also any pigment liable to be released from the rubber composition by the action of the oil. This precaution is unnecessary in the case of hose for dark colored materials such as crude oil, distillate, fuel oil, and dark lubricating oils and greases.

The tube of paint spray hose is subjected to solvent action by the volatile paint fluid. Therefore, it should not liberate carbon black or any other material that may impair the brightness of a light colored paint or enamel, nor tend to obstruct the spray outlet of the nozzle. Magnesium carbonate because of its whiteness is considered a good filler for the tube of paint spray hose.

The solvent action of gasoline necessitates resort to special constructions the better to insure long service to the hose. Two of several gasoline hose constructions are pictured in Figure 2, A and B. Both utilize spiral metallic tubes.

In Figure 2 A the hose is made up with four plies of fabric, a thick rubber cover and tube, and an inner tube of closely woven fabric. This tube lining is made impervious to gasoline by special treatment. A spiral of flat wire is embedded flush with the lining to give a smooth clear passageway.

Figure 2 B shows a section of gasoline hose made with a flexible metal lining covered with a thick rubber cushion and a heavy woven outer cotton jacket.

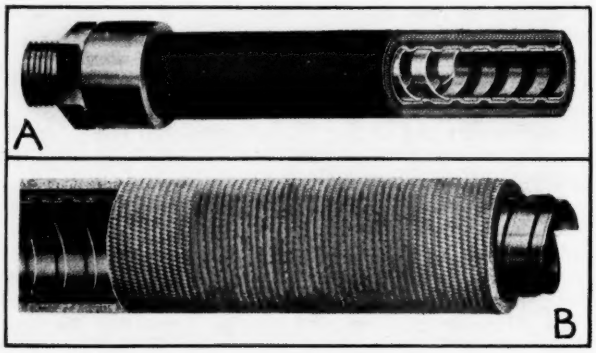


Fig. 2. Gasoline Hose Constructions

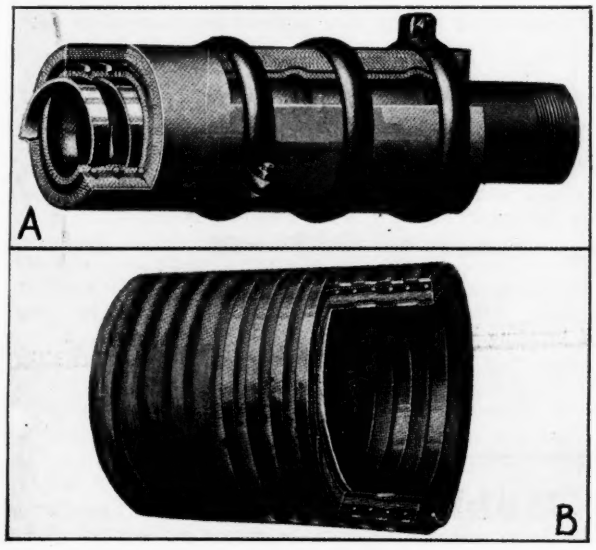


Fig. 3. Oil Loading Hose

Loading and unloading petroleum between ship and shore requires heavily reenforced hose suitable for either pressure or suction service. Two constructions of hose for this purpose differing in details are pictured in Figure 3. A represents a 6-inch hose of one construction coupled to a pipe nipple and made up in the following manner: The inside spiral is flat galvanized steel, ¾ by $\frac{3}{16}$-inch with space between coils of ¾-inch. One ply of heavy duck, frictioned with oil resisting rubber is next applied, followed by a 3/32-inch oil proof sheet rubber and then five plies of heavy, frictioned duck, affording flexibility and maximum resistance to internal pressure. A thin sheet of pure gum is then added followed by a spiral of 7/32-inch wire rope, a filling of pure gum and two plies of heavy, frictioned duck. The rubber cover, made of special oil and wear resisting stock, is carried over the ends of the hose to protect the duck. This construction makes for maximum strength, flexibility, and endurance.

Figure 3B shows a loading hose made to withstand the severe twisting and bending occasioned by loading tankers from pipe lines laid on the ocean bed as indicated in Figure 1.

The body of the hose is built of extra heavy rubberized duck plies with three spirals of heavy galvanized steel wire, on inside and outside. The outside spiral is sunk flush with the heavy rubber cover giving the hose a smooth outside surface. Ends of hose are reenforced with extra heavy duck plies to prevent breakage at the nipples.

Acid Hose

Water hose is not suited for conducting strong acids, alkalies, and other corrosive liquids and should not be so used. The rubber in water hose is not adapted by quality, cure, or composition to resist chemical attack, nor does water hose construction provide protection to the cotton fabric against destruction by chemical action. However, many acids and other chemicals can be handled in rubber hose and tubing compounded to resist them. The tube and cover are always heavier in such hose than in water hose. Also the hose ends should be capped or sealed with rubber to protect the cotton fabric from injury. Rubber will not give satisfactory or economical service for sulphuric acid 50 per cent or stronger; concentrated nitric acid; strong mixed acids; chlorine; bromine; fluorine; and ozone gases.

The kinds and strengths of acids and chemical solutions successfully handled by highest grade acid hose are noted in Table 1[1].

TABLE 1

CHEMICAL LIQUIDS HANDLED IN SPECIAL HOSE

Liquid Acids	% Concentration by Weight	Maximum °F.
Hydrobromic	Concentrated	100
Hydrofluoric	Concentrated	150
Hydrofluosilicic	Any concentration	150
Muriatic (hydrochloric)	Concentrated	150
Nitric	Up to 25%	100
Phosphoric	Up to 50%	150
Sulphuric	Up to 50%	150
Solutions		
Caustic soda and potash	Up to saturation	150
Calcium chloride	Up to saturation	150
Calcium hypochlorite	Up to saturation	100
Copper sulphate	Up to saturation	150
Sodium acid sulphate	Up to saturation	150
Sodium hypochlorite	Up to saturation	100

High grade water hose is suitable for handling mild chemical liquids such as 50 per cent acetic acid, carbonic acid, pyroligneous acid, sulphurous acid, aqua ammonia, ferrous sulphate, brine, zinc sulphate, etc.

Steam Hose

Steam hose is subjected to particularly destructive effects of high temperature, pressure, flexing, and abrasion, particularly when used in stone quarries, pile driving, boiler tube cleaning, etc. The heat tends to rapidly harden tube, friction, and cover and to weaken the duck. Remarkable endurance, however, can be secured by compounding the rubber with heat resisting materials, curing the stock with low modulus, and constructing the hose with relatively heavy tube, cover, and a skim of rubber on one side of the frictioned duck.

Steam hose, in common with hose for other purposes is armored for protection against kinking and abrasion by such means as applying a woven cotton or marline jacket or winding with wire or marline. When ordering steam hose the steam pressure should always be specified.

Table 2 is a conservative guide for finding the ply of steam hose suitable for various steam pressures and hose sizes.

TABLE 2

WORKING PRESSURES OF STEAM HOSE

Hose Sizes Inches	Duck Plies	Steam Pressure Pounds	Hose Sizes Inches	Duck Plies	Steam Pressure Pounds
¼	3	30	1¼	4	40
	4	60		5	50
	5	80		6	60
	6	100		7	70
				8	100
¾	3	20	1½	4	30
	4	50		5	50
	5	60		6	60
	6	90		7	70
	7	100		8	90
				10	100
1	4	40	2	5	30
	5	60		6	40
	6	70		7	60
	7	90		8	70
	8	100		10	100

TABLE 3

TEMPERATURE OF STEAM AT VARIOUS GAGE PRESSURES

Lbs. Per Sq. In.	°F.	Lbs. Per Sq. In.	°F.
10	240	75	320
20	260	80	324
30	275	90	331
40	288	100	338
50	298	125	353
55	303	150	366
60	307	200	388
65	312	225	398
70	316	250	406

[1]Data from The B. F. Goodrich Co., Akron, O.

Construction Compared

The laboratories of The B. F. Goodrich Co., The Goodyear Tire & Rubber Co., and the Boston Woven Hose & Rubber Co., investigated individually and independently the comparative durability of steam hose made with a seamless or plied tube, and made with a simple multi-ply duck construction, and braided construction.[2]

Consistent results were obtained and summarized in the report as follows:

Three different experimental laboratories, working individually and independently, found consistent results in an effort to determine the relative values of seamless and plied tubes, and of simple duck and duck supplemented by braiding. From the data gathered two conclusions concerning these relative values are obvious and irrefutable:

1. Steam hose made with seamless tube (in practice by the tube-machine method) is superior in endurance under steam pressure to hose with tube made up of successive plies of a sheeted stock, sometimes known as a calendered tube. The hose with plied tube was found to fail by the splitting and separation of the seam necessarily formed at the surface of the tube in its construction.

2. Steam hose with its fabric constructed of successive plies of frictioned duck is superior in endurance, and the practical equal in expansion and contraction of hose made of a fewer number of plies of duck supplemented by plies of braiding.

It is most advantageous to user and to manufacturer alike to construct steam hose with a seamless tube and for its fabric element a sufficient number of plies of duck only.

[2] "Construction of Steam Hose," by John M. Bierer. Paper read at the annual meeting of the American Society for Testing Materials at Asbury Park, N. J., June 22-24, 1920. India Rubber World, Aug. 1, 1920, pp. 724-5.

Reclaimed Rubber

IN RECENT years a radical change of view on the part of rubber compounders has taken place with regard to the technical importance of reclaimed rubber. Rubber goods manufacturers no longer regard it simply as a substitute for crude rubber but accept it on its merits as a valuable compounding ingredient. In a recent article[1] the case is well stated. The facts are well known to all rubber technologists but are worth reiterating.

Reclaim as an antidote for high-priced crude was one of the weapons recently employed to combat the high prices created by the Stevenson Restriction Act. American consumption of crude rubber amounted to over 440,000 long tons in 1929 valued at about $200,000,000, or about 20 cents a pound; while in the same period approximately 200,000 long tons of reclaimed rubber valued at about $26,000,000, or about 5.8 cents per pound, were used. Reclaimed rubber thus represented about 31 per cent in quantity and about 11.5 per cent in value of the total rubber consumed. Now, however, the price situation has changed so that crude rubber is cheaper than reclaimed rubber.

It spite of its limitations as to color and tensile properties, a reclaimed rubber containing only 55 per cent of rubber hydrocarbon sells for 5½ cents per pound whereas the best grades of crude rubber may be bought for 6 cents per pound. In other words reclaimed rubber hydrocarbon inferior in stretch, strength, and abrasion resistance costs 10 cents per pound whereas the superior source of this substance can be obtained for a much lower figure.

There has been a decrease in the consumption of reclaimed rubber; but when comparisons are made in relation to the crude rubber consumption, a new view is unfolded. To be sure, the proportion of reclaimed to crude rubber consumed is also declining, but at so reduced a rate that for economic purposes it is almost negligible. In other words the reclaimed rubber industry seems to be suffering primarily from the general business depression and only secondarily from the cheaper crude rubber.

Why should the rubber industry, in an uncomfortable condition, use the reclaimed product at all when the superior crude product can be obtained at almost one-half the price? In addition to its similarity to crude rubber, reclaim possesses properties which differ in degree and kind. These differences are valuable enough to warrant the higher cost involved in using it. The advantages appear in the different stages of manipulation, vulcanization, or even utility in the finished product.

Thus it is a curious fact that a combination of crude rubber with most reclaimed rubbers produces a mixture which is more plastic than either alone. Such combinations mix much faster and absorb powdered fillers at a more rapid rate, not only increasing production but also reducing power consumption and wear and tear on equipment. A larger volume of inert fillers may also be thus incorporated without producing the overmilled effect that often results when crude rubber alone is used.

Owing to the fact that certain types of reclaimed rubber resemble semi-vulcanized rubber when cold, its intelligent employment may eliminate preliminary vulcanization or semi-cure in processing. The automobile top industry has not as yet found a substitute for some grades of reclaimed rubber which not only take a perfect impression of the embossing rolls but will maintain that impression during the heat of vulcanization. Crude rubber compounds are apt to be too springy and tend to thin down, run, and obliterate the desired impressions.

Reclaimed rubbers, when intelligently employed, effect a marked reduction in the time required for complete vulcanization. In addition to their content of rubber hydrocarbon, reclaimed rubbers also contain valuable ingredients in an excellent state of dispersion.

There is a vast difference between crude and reclaimed rubber when subjected to the action of rubber solvents. Crude rubber, especially after milling, will readily go into solution. Reclaimed rubber will swell but will remain as such surrounded by the clear solvent. This difference in the action of solvents is taken advantage of in spreading of textile fabrics and gasoline hose tubes.

Thus there are grades of reclaimed rubber available much better suited than crude rubber for many spreader operations. Such solutions are not so springy as those made from crude rubber. As a result, heavier coatings may be applied per pass. Furthermore, since the solvent is held less tenaciously by the reclaimed rubber, evaporation proceeds at a much faster rate and production is speeded up. The resulting rubber surfaces are firmer, and this condition has its advantages in that there is an absence of troubles owing to the sticking of coated surfaces or the picking of dirt and nap if the coated fabric is rolled up on itself in process.

These are some of many considerations which induce rubber manufacturers to retain reclaimed rubber in many of their formulas. Reclaimed rubber no longer stands merely as a guard against high prices for crude rubber but is recognized as a valuable compounding ingredient imparting distinctive properties not readily obtained in other ways.

[1] *Industrial Bulletin*, of Arthur D. Little, Inc., Cambridge, Mass., June, 1931, No. 54.

Testing Results Compared[1]

How Different Laboratories Check on Adhesion and Flexing Tests of Belting and Belting Duck

W. L. Sturtevant[2]

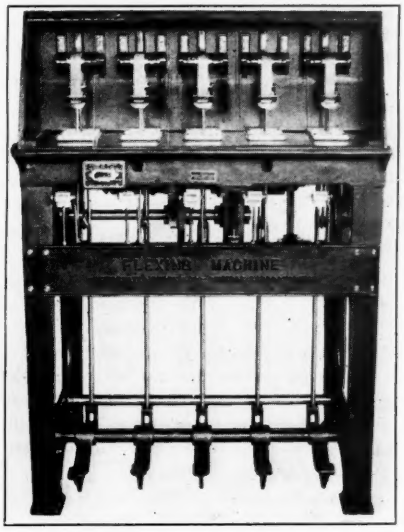
THE preceding part of this article dealt with the effect on tensile tests of various shapes of cutting dies according to the practice of a number of rubber laboratories. In this part, comparison is made of adhesion and flexing tests on belting as made by the same group of laboratories.

Adhesion Tests

Tests were made on 5-ply transmission belting by four laboratories. All samples were taken from the same belt within an area of 3 square feet. The tests were made by the method prescribed by the American Railway Association specified as follows:

"The test strip is 6 inches long. Two test specimens of two plies are taken from this strip and tested individually. The plies are separated by hand at one end of the specimen for a sufficient distance to permit attaching the grips.

"One separated end is clamped in a stationary grip, the other end being clamped in a freely suspended grip hanging vertically, to which the prescribed test weight is attached with suitable provision for supporting and slowly releasing it without jerking. The weight required to separate the sample and the distance through which the separation takes place are noted over a period of 4 minutes during which the total separation shall not exceed 4 inches."



Flexing Test Machine

Laboratories A, B, C, and D using this method obtained the results reported in Table 1 showing that different laboratories are able to check fairly well on adhesion tests when using a standard test method.

TABLE 1

Lab.	Ply	Pounds Friction	% Dev. from Aver.
A	1st	26.75	+2.2
	2nd	26.50	+1.3
	3rd	25.25	—3.5
	Aver.	26.17	2.3
B	1st	26.33	+3.1
	2nd	25.66	+0.4
	3rd	24.66	—3.5
	Aver.	25.55	2.3
C	1st	24.50	—1.7
	2nd	25.75	+3.3
	3rd	24.50	—1.7
	Aver.	24.92	2.2
D	1st	26.66	+4.1
	2nd	24.50	—4.3
	3rd	25.66	+0.2
	Aver.	25.61	2.9

A high adhesion test of 30 pounds or more does not guarantee that a belt will give superior service over a belt having a 20-pound adhesion test. It is not intended to convey the impression that a good belt may not have a moderately high adhesion test. However, too much emphasis has been placed upon high adhesion test alone, and a method has long been needed that would give a truer indication of the service life of a belt than the adhesion test. Concerning the adhesion of belting plies the following paragraph is quoted from a recognized authority on belting and transmission problems:[3]

"A very strong friction defeats its own purpose, because the real function of the friction is to make a flexible, permanent bond to permit full flexing of the plies of the belt around the pulleys with a low generation of heat. Strong friction prevents this flexing because it holds the plies rigid with the result that the belt is heated, and the heat thus generated quickly disintegrates the rubber compound and the plies separate. It has been found that high frictions can be obtained by various methods of vulcanization; therefore, the real quality of the friction can be best determined after the belt is in operation on the pulleys."

Flexing Test

When considering tests that will give a truer indication of the service life of a belt than the adhesion test, it must be understood that the action of the rubber bond in a belt in service is primarily a continual flexing back and forth over the pulleys. A machine for indicating the true value of the rubber compounds of a belt should, therefore, be capable of measuring resistance to flexing.

The yearly average sales value of rubber transmission belting for 1923 to 1927 was over $13,000,000. With these figures in mind, and realizing that transmission belting is a vital part of any factory or production unit, the American Society for Testing Materials recognized the importance of developing service tests for so important a product. Accordingly, Sub-Committee XVI on Flexing Tests, of Committee D-11, was organized composed of the following members: U. S. Rubber Co. General Laboratories, The Goodyear Tire & Rubber Co., The B. F. Goodrich Co., Boston Woven Hose and Rubber Co., and The Manhattan Rubber Mfg. Division, of Raybestos-Manhattan, Inc. This sub-Committee was charged with the development of a satisfactory

[1] Concluded from India Rubber World, May 1, 1931.
[2] Technical superintendent, The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J.
[3] "Mechanical Power Transmission." By William Staniar. McGraw-Hill Book Co., New York, 1928.

TABLE 2

Laboratory A		Laboratory B		Laboratory C		Laboratory D		Laboratory E	
No. of Flexings	% Dev. from Aver.	No. of Flexings	% Dev. from Aver.	No. of Flexings	% Dev. from Aver.	No. of Flexings	% Dev. from Aver.	No. of Flexings	% Dev. from Aver.
38,387	—1.1	39,600	+11.5	45,556	+15.8	29,650	—27.0	49,180	+3.4
40,480	+4.3	40,000	+12.6	41,280	+5.0	30.040	—26.0	44,550	—6.3
34,321	—11.5	32,500	—8.5	41,358	+5.2	31,393	—22.7	46,900	—1.4
33,280	—14.2	31,900	—10.2	41,440	+5.4	32.816	—19.2	44,100	—7.3
53,415	+37.7	32,000	—9.9	41,400	+5.3	32.929	—19.0	45,700	—3.9
21,280	—45.1	42,000	+18.2	39,398	+0.2	35,848	—11.8	67,580	+42.0
37,120	—4.3	36,300	+2.2	51,340	+30.6	33,444	—17.7	39,786	—16.3
46,400	+19.6	37,900	+6.7	37,274	—5.2	43,308	+6.6	40,510	—14.8
44,480	+14.6	29,600	—16.7	37,422	—4.8	41,763	+2.8	56,345	+18.4
.....	.....	37,900	+6.7	37,394	—4.9	41,425	+1.9	40,510	—14.8
.....	.....	35,100	—1.2	35,221	—10.4	41,403	+1.9	47,720	+0.3
.....	.....	39,700	+11.8	35,206	—10.4	55,690	+37.0	44,547	—6.4
.....	.....	35,000	—1.5	35,184	—10.5	51,295	+26.2	49,501	+4.0
.....	.....	35,000	—1.5	35,123	—10.7	50.243	+23.6	48,071	+1.0
.....	.....	28,400	—20.1	35,264	—10.3	58,263	+43.4	48,611	+2.2
Averages.. 38,796	16.9	35,526	9.3	39,324	9.0	40,634	19.1	47,574	9.5

test, and after much experimental work, an apparatus known as the flexing machine, originated by the United States Rubber Co. General Laboratories, and shown in the accompanying illustration, was decided upon.

In an endeavor to determine if various testing laboratories could check each other on flexing machine results, samples cut longitudinally from a high grade 4-ply belt, having all plies skimmed, were sent to five rubber laboratories, each of which was equipped with the same type of flexing machine. Results were reported as tabulated in Table 2 shown above.

A second set of flexing tests on a different belt was made with practically the same results. The reason for inability to check within closer limits is not clear, although the test as at present outlined may be too highly accelerated. There is also a lack of a proper method for determining the end-point of the test. Following is the method used with success in the General Laboratories of the United States Rubber Co.[4]

Flexing Test End-Point

"A thick coat of molten carnauba wax is brushed on the outer side of the flexing sample. It is necessary to cover only the portion of the strip around the hub. As soon as separation begins, the temperature of this section increases very rapidly and the wax melts. The melting of the wax starts with a small area and gradually spreads as separation increases. This serves as a warning that complete separation will occur shortly thereafter and eliminates the necessity of examining the sample at frequent intervals during the early part of the run. The interval between the melting of the wax (the time at which separation actually starts) and complete separation across the sample is not always constant. For example, a sample with a short flexing time will show complete separation soon after the wax melts, whereas a sample with a greater flexing time might require two or three times as long. However, among samples having similar flexing times, the interval between the melting of the wax and complete separation is fairly constant. The time of complete separation is a matter of judgment by the operator. Strips are inspected for separation by freeing one end from the jaw, bending in reverse position, and looking through.

"In the case of belting which is run on a 3.175 cm. (1.25 inch) hub, the temperature obtained is not sufficient to melt the wax, and therefore, the wax method is not used for belting."

[4]W. A. Gibbons. *Ind. Eng. Chem.*, Analytical Edition, Jan. 15, 1930, p. 99.

Tests of Belting Duck

How closely different laboratories can check in testing standard belting fabric was ascertained thus: Samples from the same roll of 32-ounce belting fabric were tested in three different textile laboratories. All samples were humidified 8 hours at 65 per cent relative humidity, at 70° F. Breaking tests were made by the A. S. T. M. grab method using a Scott 800-pound capacity tensile machine. The results are listed in Table 3.

The average warp tests vary from 540 to 585 pounds, and the average filling tests from 298 to 324 pounds. Satisfactory breaks generally occur on filling samples, and actual rupture occurs well within the testing machine jaw gaps. In testing warp samples, there are certain irregularities which might influence test results, such as the tendency of the sample to slip in the jaws of the machine causing abrasion of the fabric structure thereby reducing the breaking strength.

The results in Table 3 show that fabric testing laboratories are able to check results on 32-ounce belting fabric. A great advance in the standardization of belting fabrics has occurred in recent years. The standardization of fabrics, test methods, and machines, has been carried on by Committee D-13 on Fabrics, of the A. S. T. M., and are now used by all progressive fabric and rubber manufacturers.

The work here recorded emphasizes the importance of standard test procedures and suggests that many of the so-called mysteries of the rubber business so troublesome in the past, can be cleared up by standard procedures not only in test work, but in rubber and fabric manufacturing methods as well.

TABLE 3

Laboratory A				Laboratory B				Laboratory C			
Pounds Warp Test	% Dev. from Aver.	Pounds Filling Test	% Dev. from Aver.	Pounds Warp Test	% Dev. from Aver.	Pounds Filling Test	% Dev. from Aver.	Pounds Warp Test	% Dev. from Aver.	Pounds Filling Test	% Dev. from Aver.
550	0.00	322	+6.62	583	—0.34	305	—5.86	531	—1.67	284	—4.70
528	—4.00	298	—1.32	579	—1.02	302	—6.79	510	—5.56	302	+1.34
551	+0.20	302	0.00	604	+3.25	330	+1.85	545	+0.93	299	+0.33
542	—1.40	302	0.00	597	+2.05	343	+5.86	522	—3.33	291	—2.35
533	—3.10	300	—0.66	551	—5.81	332	+2.47	520	—3.70	301	+1.01
563	+2.36	305	+0.99	598	+2.22	330	+1.85	569	+5.37	296	—0.67
562	+2.18	301	—0.33	580	—0.85	324	0.00	537	—0.55	295	—1.01
569	+3.45	294	—2.65	594	+1.54	...	.....	542	+0.37	305	+2.35
562	+2.18	290	—3.97	586	+0.17	...	.....	577	+6.85	298	0.00
546	—0.73	298	—1.32	574	—1.88	....	.....	546	+1.11	305	+2.35
Aver.... 550	1.96	302	1.78	585	1.91	324	3.53	540	2.94	298	1.61

Dealers' Stocks of Automobile Tires

As of April 1, 1931[1]

FINAL statistics, as of April 1, 1931, compiled by the Rubber Division of the Department of Commerce cover the stocks held by retailers, exclusive of mail order stores, and exclusive of stocks held by large chain store organizations run by independents and by some of the leading tire manufacturing companies.

The increasing application of mass distribution principles to tires during the past two years has made the official surveys, covering independent retailers, less indicative than formerly of the situation they were intended to clarify: namely, the quantity of tires in hands of distributers. The customary practice of trade statisticians has been to estimate the total number of tires held by independent dealers by multiplying the average stock per dealer by an estimated number of total dealers. The total number of tire dealers is not definitely known, but estimates generally have been that there were about 100,000 independent dealers in 1925-6 and that this number has since declined annually to around 75,000 in 1930. Some trade experts believe the number of independent retailers at present is about 70,000.

Since the tire-company-controlled and some other chain outlets have much higher average stocks per outlet than the independent retailers, the former method of estimating is now imperfect. In the present survey an attempt has been made to secure statistics that will be more helpful for determining the total quantity of tires held by distributers.

Under the caption "mass distribution" as used in this report is included the distribution of tires (a) by the two principal mail order houses direct by mail or through retail stores to consumers; (b) by two supply companies merchandising special brand tires (one principally through its own stores and the other principally through retail outlets of oil companies), also by a third independent chain system; (c) and by three tire manufacturing companies through chain systems operated or controlled by the companies. Under this latter heading, reports included from two companies cover only those stores reporting stocks of over 500 casings on April 1, 1931. Reports received from firms listed above are not included for either 1930 or 1931, in the following statistics, which are believed to be closely comparable as regards types of dealers, some tire-company controlled outlets being included in this group for both dates.

The average stock of automobile casings per dealer for April, 1931, for comparable dealers, is shown as 78.4 against 83.0 a year previous, a decline of 4.6 casings per dealer. The total number of casings held by independents must be estimated by assuming a certain number of active dealers for 1930 and also for 1931.

DEALERS' STOCKS OF AUTOMOBILE TIRES

	April 1, 1930. Number Reporting	April 1, 1930. Average per Dealer	April 1, 1931. Number Reporting	April 1, 1931. Average per Dealer
Total casings	2,550,222	30,717	83.0	2,249,927	28,707	78.4
High pressure	544,923	24,309	22.4	330,878	21,150	15.6
Inner tubes	3,637,543	30,677	118.6	3,071,686	28,846	106.5
Solids		40,829	1,436	28.4	28,193	1,296	21.8

Dealers' Stocks of Automobile Tires by States, April 1, 1931.

	Total Casings			Inner Tubes			Solids and Cushions		High Pressure Casings	
	No. of Dealers Reporting	No. of Tires on Hand	Average No. per Dealer	No. of Dealers Reporting	No. of Tires on Hand	Average No. per Dealer	No. of Dealers Reporting	No. of Tires on Hand	No. of Dealers Reporting	No. of Tires on Hand
New England										
Maine	400	24,381	61.0	397	31,149	78.5	13	174	277	4,306
New Hampshire	208	14,659	70.5	212	19,508	92.0	4	102	162	2,444
Vermont	202	11,197	55.4	203	14,959	73.7	6	108	138	1,854
Massachusetts	723	60,932	84.3	733	76,183	103.9	31	581	478	7,022
Rhode Island	122	8,833	72.8	122	15,118	123.9	7	1,497	87	1,214
Connecticut	295	20,732	70.5	277	25,920	87.3	15	181	187	2,306
	1,950	140,844	72.2	1,964	182,837	93.1	76	2,643	1,329	19,145
Middle Atlantic										
New York	1,845	216,319	117.2	1,832	271,825	148.4	112	4,916	1,311	24,556
New Jersey	667	50,463	75.7	677	72,014	106.4	32	1,009	445	5,924
Pennsylvania	2,334	148,577	63.7	2,314	187,735	81.1	123	1,604	1,540	21,140
	4,846	415,359	85.7	4,823	531,574	110.2	267	7,529	3,296	51,620
East North Central										
Ohio	1,590	123,841	77.9	1,599	158,209	98.9	71	978	1,098	17,001
Indiana	852	68,086	79.9	860	96,881	112.7	41	421	640	9,273
Illinois	1,455	125,816	86.5	1,455	166,320	114.3	63	1,475	1,109	17,220
Michigan	1,167	84,401	72.3	1,187	121,826	102.6	56	1,727	828	10,498
Wisconsin	1,080	74,572	69.0	1,077	101,242	94.0	47	1,231	864	12,604
	6,144	476,716	77.6	6,178	644,478	104.3	278	5,832	4,539	66,596
West North Central										
Minnesota	926	84,585	91.3	932	116,430	124.9	89	625	726	12,223
Iowa	943	57,727	61.2	935	85,518	91.5	36	1,210	777	10,837
Missouri	918	77,465	84.4	907	101,005	111.4	48	1,218	708	14,170
North Dakota	458	22,440	49.0	464	37,496	80.8	16	374	366	4,390
South Dakota	394	20,380	51.7	397	34,092	85.9	14	369	317	3,497
Nebraska	497	32,913	66.2	494	51,043	103.3	18	190	398	5,932
Kansas	808	62,830	77.8	813	91,940	113.1	22	993	669	10,000
	4,944	358,340	72.5	4,942	517,524	104.7	183	4,979	3,941	61,049
South Atlantic										
Delaware	62	4,022	64.9	58	5,719	98.6	5	91	48	731
Maryland	365	24,076	66.0	362	34,109	94.2	14	401	243	4,134
Dist. of Col.	59	14,480	245.4	59	19,503	33.1	5	155	38	1,223
Virginia	737	35,972	48.8	739	52,376	70.9	32	300	464	5,938
W. Virginia	437	26,002	59.5	438	39,216	89.5	23	264	280	4,032
No. Car.	443	32,485	73.3	445	46,056	103.5	18	232	318	5,904
So. Car.	245	13,382	54.6	252	20,557	81.6	4	23	164	2,208
Georgia	350	25,353	72.4	368	39,438	107.2	21	394	272	4,288
Florida	273	26,922	98.6	267	33,999	127.3	10	335	206	3,834
	2,971	202,694	68.2	2,988	290,973	97.4	132	2,195	2,033	32,292
East South Central										
Kentucky	386	24,968	64.7	394	39,916	101.3	20	418	277	3,833
Tennessee	327	29,572	90.4	335	44,552	132.6	16	256	256	4,786
Alabama	286	20,289	70.9	291	30,860	106.0	19	235	210	3,478
Mississippi	327	14,729	45.0	330	24,651	74.7	14	214	245	2,758
	1,326	89,558	67.5	1,351	139,979	103.6	69	1,123	988	14,855
West South Central										
Arkansas	309	17,171	55.6	310	28,477	91.9	9	218	227	2,832
Louisiana	271	20,054	74.0	273	31,309	114.7	8	45	196	4,268
Oklahoma	476	48,481	101.9	477	67,501	141.5	23	436	379	6,745
Texas	1,341	98,416	73.4	1,389	158,862	114.4	39	534	1,069	17,047
	2,397	184,122	76.8	2,449	286,149	116.8	79	1,233	1,871	30,892
Mountain										
Montana	304	23,630	77.7	308	33,291	108.1	14	186	338	3,183
Idaho	194	14,126	72.8	200	18,542	92.7	12	98	157	1,960
Wyoming	143	9,715	67.9	139	13,883	99.9	8	176	108	1,315
Colorado	408	34,031	83.4	414	47,421	114.5	19	250	319	5,877
New Mexico	154	7,781	50.5	152	12,245	80.6	4	81	112	1,038
Arizona	151	12,850	85.1	152	15,901	104.6	10	63	111	1,824
Utah	178	10,028	56.3	180	12,934	71.9	9	88	118	1,570
Nevada	44	2,576	58.5	44	4,277	97.2	2	15	33	369
	1,576	114,737	72.8	1,589	158,494	99.7	78	957	1,196	17,136
Pacific										
Washington	558	74,749	134.0	561	86,301	153.8	28	402	433	9,533
Oregon	370	27,337	73.9	367	34,736	94.6	16	202	292	4,676
California	1,502	158,050	105.2	1,509	188,494	124.9	84	1,041	1,159	22,096
	2,430	260,136	107.1	2,437	309,531	127.0	128	1,645	1,884	36,305
Unallocated	123	7,421	60.3	125	10,147	81.2	6	57	73	988
Total United States	28,707	2,249,927	78.4	28,846	3,071,686	106.5	1,296	28,193	21,150	330,878

[1] Special Circular No. 2994, Rubber Division, United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C.

The stocks held by the eight mass distributers, previously described, are tabulated below and are estimated to be 90 per cent complete for all mass distributers, exclusive of firms included with independent retailers. Comparable statistics for 1930 or previous years are not available, but there is reason for believing that stocks under this heading have been increased during the past year enough to just about offset the indicated decline in stocks held by independent retailers. There is also reason for believing that the total number of individual retail tire outlets (combining independents and those used by mass distributers) in the United States is greater at present than it was a year ago, owing to the stocking of tires by numerous oil and gas stations which did not handle tires a year ago.

MASS DISTRIBUTERS' STOCKS
April 1, 1931

Total casings	1,402,115
High pressure casings	47,000[1]
Inner tubes	1,547,586
Solids	854

[1] Incomplete figure; high pressure casings not reported separately by some mass distributers.

The growth of chain store systems in the distribution of oil and gas, groceries, druggists' supplies, shoes, and goods sold through 5- and 10-cent stores, has been rapid in recent years. A tire manufacturer who maintains his own retail distribution chain secures as one result a more stable predictable market. To some degree an independent chain through its retail stores offers a similar assured market to a manufacturer. Independent dealers who continue to handle the product of a single manufacturer year after year offer practically the same kind of an assured market. More and more independent dealers are handling but one make of tire, the percentage of such dealers having steadily increased from 43.2 per cent in 1925 to 70.0 per cent in 1931. Thus independent dealers appear to realize increasingly the advantages to them resulting from being connected with a single manufacturer.

An analysis by volume groups has been prepared of the reports from dealers having stocks of casings, and a comparison made to the survey of April 1, 1930. Generally speaking, this year a greater percentage of reports fell into the class of dealers having less than 25 casings in stock, a smaller percentage of reports falling into the classes of dealers having 25 casings or more in stock.

During the past year there has been further extension of the mass distribution principle to tire merchandising. A careful study of reports received from large distributers which did not report in 1930, and of the reports from firms which did report in 1930, indicates that a reduction in stocks held by small distributers is offset by an increase in the stocks held by large distributers, with little net change in total stocks in hands of distributers. The entry of oil companies into tire distribution has added numerous new retail outlets, offsetting any shrinkage in the number of independent dealers.

The higher "average casings per dealer" figure shown in the preliminary report of April 1, 1931, dealers' stocks resulted from inclusion of stocks held in stores of large distributers, and while not strictly comparable with reports of previous years, is in line with the tendency (frequently noted in past surveys) toward concentration of tire distribution in the hands of larger dealers. The average independent dealer's establishment is becoming more and more a general automotive supply station.

Rubber Problems Confronting Automotive Engineers

(*Continued from page* 57)

out affecting its functioning, is shown in the drawing at the right in Figure 5. The upper design makes it necessary that the mold be made in four parts, with the possibility of trouble in extracting the rubber part from the mold, while the lower design makes the mold a very simple one, with very little trouble in extracting the piece. These are merely examples showing specific cases in which considerable time has been saved by small changes in design that do not in any way affect the functioning of the parts. This does not mean that it will be so simple to make all parts as free from trouble as these. It merely shows that all designs should be watched for these characteristics.

Molds that make manufacturing expensive are pictured in Figures 6 and 7. Radii at the ends of the ferrule complicate the mold in Figure 6 by necessitating the radii being cut in top and bottom mold plates. The mold represented in Figure 7 is very expensive to make because its cavities are engraved.

Effect of Dimensional Variations

As has been mentioned before, exact dimensions are very hard to obtain in most rubber parts. Each stock varies greatly in shrinkage, as do different shapes. Inserts of different materials also cause distortions in shrinkage. Pure gum stocks shrink much more than reclaimed stocks. High drawing at the right. The upper design makes it necessary out materially affecting its functioning, is shown in the

A burlap backed mat of high reclaimed stock content will remain flat after curing; those of high gum content will warp and twist. Parts having rubber cured between metal will have concave rubber surfaces instead of flat surfaces. These can be corrected only by grinding. From this statement it can be seen that as much tolerance as possible should be given to such parts. A good rubber will shrink as much as ⅛-in. to the foot.

Where dimensions must be held to close tolerances, molds have to be figured as close as possible and then run in trial cures. If the dimensions are then off, the mold must be cut over and the whole procedure repeated. This is all paid for in one way or another by the automobile manufacturer, and in some cases is necessary.

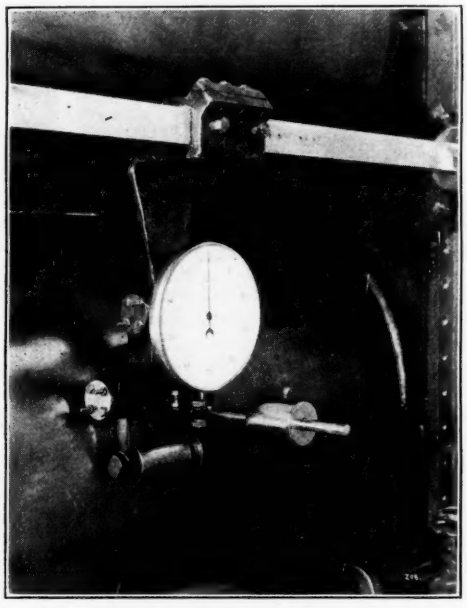
Minor Gain but Major Loss

Tires would cost less to make were the Egyptian long-staple cotton much used in their making not subject to a duty of 7 cents a pound; and of such cotton the United States imports some 300,000 bales yearly. Of course the new tariff was intended to benefit the raisers of similar cotton in the Southwest, but thus far it does not appear to have helped them appreciably, much less relieved the general distress in the cotton market. The British, who have been taking some 8,000,000 bales yearly for their spinning mills, may not actually resent the levy laid on one of their colonial products, but they are increasingly stressing the advisability of utilizing still greater areas in their own possessions for the planting of cotton for their mills instead of importing so much from non-British sources. Thus the gaining of a small advantage for a few may occasion a far greater loss for the many. Rubber leaders predicted as much when the duty was first proposed; but log-rollers had more weight with Congress than sane economists.

Calender Thickness Gage

A Practical Instrument for Measuring the Amount of Rubber Applied to Fabrics

C. S. McChesney[1]



Dunlop Thickness Gage

AVOIDABLE waste of material takes place in every manufacturing department of a rubber plant. In calender work, irregularity of gaging accounts for constant loss of stock and variations in quality and weight of goods. Various types of stock gages have been devised for the guidance of calender operators. Certain of these are designed for hand operation to measure the thickness of samples cut from the calender during delivery of the stock. Such gages indicate to the operator what the machine is doing at point to point in its delivery of stock.

Proper control of calender work is possible only when means are provided for measuring its thickness continuously and visibly. The most recent thickness gage is designed as a calender fixture applied opposite the middle roll for gaging the rubber coat previous to its being calendered onto the fabric. The need for an accurate practical gage has long been felt in the industry for economizing material and maintaining quality and uniformity of product.

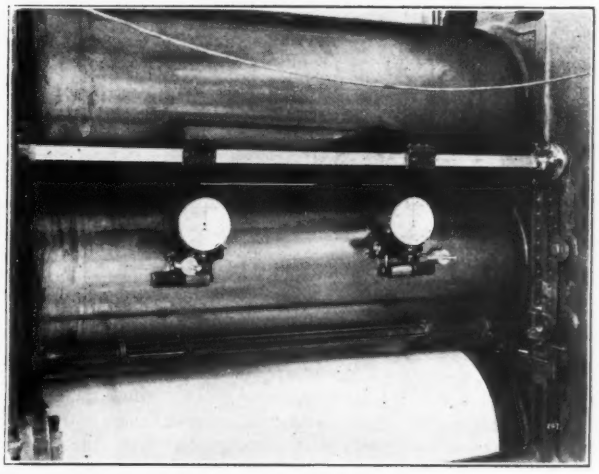
The principle upon which the gage operates is purely mechanical and very simple. A knife edge roll is forced through the film of rubber and is allowed to ride on the calender roll surface while a wide face roll is permitted to ride on top of the rubber. The interval between the positions of these two rolls is determined by the thickness of the rubber film which is indicated on the gage dial.

Two gages are necessary to equip a calender. They are set on the delivery side of the machine mounted on a square bar upon which they can be slidably adjusted to any desired spacing. Three holes are tapped in each side frame of the calender for attachment of the leveling bearings supporting the cross bar. The latter is then set in place and leveled up. The gages are attached to the bar by sliding brackets and can be moved to gage any width of stock. When suitably spaced they are locked in place by set screws after the wide face gaging roll has been set in contact for its full length with the calender roll face.

If it is desired to do so the gages can be read from the feed side of the calender by mounting a plain mirror at the proper angle over the calender. The gage dials are so arranged that they can be revolved through 180 degrees to make the readings appear proper when a mirror is used.

These gages are designed and manufactured under the best precision methods, and will accurately gage within .0001-inch from 0-inch to .100-inch continuously. Each .001-inch being opened up to 1⅞-inch reading on the dial. The knife edge roll has a flat edge of .008-inch which does not allow it to damage the calender roll face. The fact that when the gage is set up to zero and reads direct in .0001-inch (the total thickness of rubber being applied to the fabric) without any change in adjustment, and that the stock variations, such as plasticity, gravity, temperature, or conductivity, do not enter into the accuracy of the gage's operation, makes it a positively foolproof device.

The human element is eliminated because the thickness of the rubber film is indicated before it comes in contact with the fabric, and the operator provided with something to show just what kind of product he is turning out.



Pair of Dunlop Gages Spaced for Service

It is a fact that the gage of rubber applied by a calender without the use of the gage will vary as much as 7 to 10 per cent. With the aid of these instruments the calender operator can intelligently control his machine so that the variation of the gage need not exceed plus or minus 2 per cent. These gages are equally applicable on calenders for running rubber stocks for any purpose and grade as well as for skim coating. Accurate gaging of stock means control of the calendering and the elimination of waste and loss.

[1] Superintendent Engineering Division, Dunlop Tire & Rubber Corp., Buffalo, N. Y.

Latin-America Trade Prospects

Rubber Manufacturers Plan Confidently on Selling a Larger Range of Staple and Specialty Goods to Southern Countries—American Products in High Favor—Cultivating of Commercial Relations a Worth-While Study

MANY American rubber manufacturers, convinced that national and individual prosperity is increasingly dependent on the expansion of the foreign trade of the United States, are giving more earnest attention than ever to the possibilities of marketing a much wider variety of staple and specialty rubber goods in the Central and the South American republics. Generally speaking, they find the prospects very encouraging, American goods being held in high regard, and they believe that intensive research in that great field will reveal numerous opportunities for large, profitable, and enduring trade.

At the International Trade Conference in New York City recently especial stress was laid on the importance of finding a more ample outlet abroad for the industries of the United States. So great is the productivity of the country in excess of domestic consumption, leading industrialists pointed out, that in order to insure not only an early return but a long continuance of commercial progress the nation's foreign sales should be expanded at least 10 per cent beyond the present ratio. Belittling the danger of saturation and disregarding the advantages of export trade are considered grave mistakes. Even though only 10 per cent of a total $50,000,000,000 production were exported, such $5,000,000,000 marginal difference may largely determine the price at which the remaining $45,000,000,000 worth of goods may be profitably sold in the home market, and to a considerably degree it may avert the dumping of an excess production in the home field with perhaps serious trade demoralization.

While export trade with South America has declined lately, owing largely to the passing world-wide depression, it is not forgotten that from 1923 to 1928 American exports to South America gained 80 per cent, while the gain with Canada was 40, and with Europe only 13 per cent. Argentina, Brazil, and Colombia showed the larger increases, not merely because of their greater population but perhaps on account of greater concentration of merchandising efforts on those countries. That the American trade gain in the next five years may again approximate that of the 1923-1928 period many believe quite credible. Much depends, of course, on American methods and aggressiveness.

Europe is industrialized even more than the United States. Its productivity is immense. Even though it still lags in mass production, its labor cost is much less. Its home markets are adequately provided for, and there is much surplus for export. Many do not expect, for those and other reasons, much expansion there in sales of American-made goods. Nor is Europe neglecting South America, as evidenced, for instance, in the recent tour there of the Prince of Wales and the Duke of York; and the British are not alone in their "peaceful penetration."

However there is an impression abroad that Europe's best opportunities lie in the development of Africa, Asia, and Japan, presumably leaving to the United States the task of developing South America, even aiding it generously with capital as it had been aided thus by Europe in the early stages of this nation's growth. With a superabundance of raw materials, it is held that South America's urgent need is that of finished products such as American factories are so well fitted to supply until such time as our southern neighbors are quite able to provide all their requirements. We are reminded that it took the United States a long time to emerge from a like position, to become a creditor country instead of a debtor, and to become so self-sustaining. Nor can it be regarded as quite independent so long as it must rely on foreign sources, probably for a long time to come, for rubber, tin, and other essential crude materials.

American manufacturers who would do business with their southern neighbors are urged to learn more about the latter's racial and cultural characteristics, as well as their material resources and trade possibilities. Their requirements in a general way may be very much like those of the United States, but their customs and temperaments are different and may not be easily changed. As buyers, the Latins are not to be hurried; they do not succumb readily to hurrah sales campaigns. Hence the importance of sending to them not the familiar type of high-pressure salesmen, the go-getters who count on signatures on the dotted line in a first interview, but real ambassadors of commerce, preferably familiar, as are so many British, German, and other trade envoys, with the Spanish tongue (or in Brazil the Portuguese); who are congenial and "simpatico," who strive to understand the people of the country among whom they dwell, seeing their merits as well as, if not better than, their faults, and, above all, inspiring respect and confidence.

Latin-Americans are numerous, some 29,500,000 inhabiting Cuba, Mexico, and the seven Central American countries, and 58,000,000 more in the eleven countries of South America. They are progressive and in the main are aspiring to higher standards of living. They are open to conviction and will be found as quick to appreciate as any foreign buyers, the merits of American made goods. The latter obviously should not suffer by comparison with the products of other countries, prices should be reasonable, or, if higher than those of competitors, should be plainly justified by superior quality and service. The packing must conform to current usage, sales service must be unexcelled by any other, and terms must be as convenient as those of a competitor.

Few rubber manufacturers may find it feasible or necessary, like some great tire concerns, to set up branch factories in Latin-American countries. Even without such adjuncts they have an excellent chance of getting a generous share of business in the southern part of the Western Hemisphere if they go about it with real intelligence and unflagging zeal; and to the novice in exporting, and often to the experienced, one of the greatest of aids is the Department of Foreign and Domestic Commerce of the United States Department of Commerce, Washington, D. C.

What the Rubber Chemists Are Doing

Graphical Tensile-Testing Machine for Rubber Threads[1]

S. H. Hahn and E. O. Dieterich[2]

AMONG the many types of physical testing equipment which have been designed for or applied to the needs of the rubber industry, there has never appeared an entirely satisfactory graphical machine for performing tensile tests on small rubber samples, such as threads and tapes used in making golf balls and elastic fabrics and cords. None of the common machines can be applied directly to the testing of single threads, and even tests on pieces of dumbbell shape are quite unsatisfactory, largely because the standard machines are comparatively insensitive at low elongations and tensions and also because they depend on the personal accuracy of an operator to observe several points along the stress-strain curve. The Schopper ring test is not entirely successful for tests on threads.

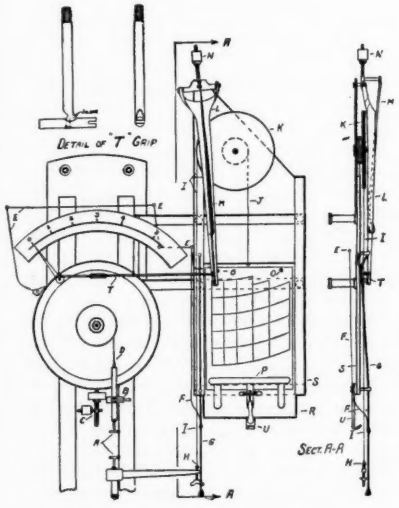


Fig. 1. Graphical Rubber-Thread Tester, a Modified Scott Tensile Machine

Accordingly it appeared that such tests on light rubber threads could best be made on a curve-drawing machine designed and constructed especially for the purpose. In many cases the use of any other machine would have been impossible because frequent tests had to be run on single, cut threads from factory production and on samples taken from storage or from woven fabric.

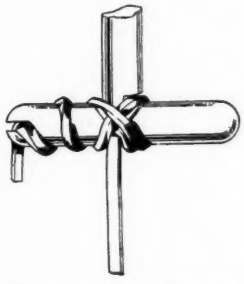


Fig. 2. Method of Mounting Thread Test Pieces on Upper Grips

Several rather severe restrictions on the design were imposed by the nature of the samples to be tested. These are as follows:

1. The breaking strength of the smallest threads to be tested is comparatively low. A 50 by 50 gage thread, the smallest ordinarily cut, has a cross-sectional area of only 0.00258 sq. cm. (0.0004 sq. in.) and a breaking strength of less than 450 gr. (1 lb.) At the same time the heavier threads require a maximum tensile force of about 2 kg. (4 lbs.) so that a full scale range of 2.26 kg. (5 lbs.) has to be provided.

2. Elongations up to about 1,000 per cent on a 5.08-cm. (2-in.) gage length have to be accommodated in testing pure gum stocks.

3. A high degree of sensitivity as compared with the usual machine is required in the region of 200 to 700 per cent elongation where the tension usually varies from about 40 to 700 gr. (0.1 to 1.5 lbs.).

4. Whatever the grips used, they must not allow the length under test to increase by creep or slippage of the rubber, and they must secure the thread so the gage marks are in full view.

It was found impossible to achieve the result desired by modifying a small 11.32-kg. (25-lb.) Scott machine designed for graphical stress-strain tests on tire cords. Friction was reduced to a minimum by the use of rotating bearings of small diameter instead of sliding parts, by the elimination of the thread-pulley-counterweight arrangement on the pen motion, by substituting wires for the usual roller chain supporting the upper pulling head of the machine, by using a lighter pen pressure, and by the elimination of the usual ratchet for catching the balance wheel at the breaking point of the sample. The full scale capacity of the machine was reduced to 2.26 kg. (5 lbs.) with provision for doubling the range without change of intermediate scale divisions.

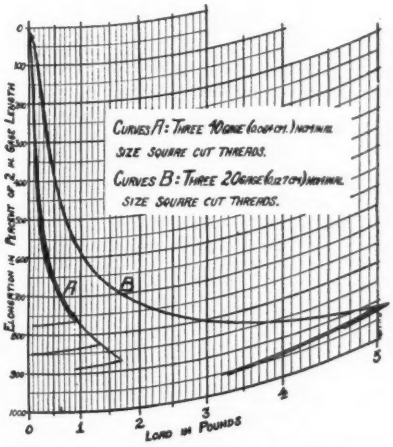

CURVES A: THREE 10 GAGE (100 CM.) INCH NOMINAL SIZE SQUARE CUT THREADS.
CURVES B: THREE 20 GAGE (50 CM.) INCH NOMINAL SIZE SQUARE CUT THREADS.
ELONGATION IN PERCENT OF 2 IN GAGE LENGTH
LOAD IN POUNDS

Fig. 3. Graph Drawn by Modified Machine

Tests and almost daily use during the past eighteen months have shown the machine to be entirely satisfactory. Even with the pen in contact with a stationary chart, the machine is sensitive to a change of force at the upper head of less than 2 gr. (0.005 lb.) at any part of its range, a sensitivity better than 0.1 per cent of the full range. The accuracy of such a machine depends primarily on the care with which the master chart is made and on the accuracy of the printed charts.

The first problem of the new design shown in Figure 1 was the development of a satisfactory grip. It was found possible to secure the ends of the thread sample at the gage marks by use of a simple knot whereby the thread was snubbed under nearly its maximum elongation around a rod of small diameter. This idea was applied in the form of notched tee of cold-rolled steel, 0.159 cm. (1/16-in.) in diameter (see detail of Figure 1), to which the

[1] Presented before the Division of Rubber Chemistry at the 80th Meeting of the A. C. S., Cincinnati, O., Sept. 8-12, 1930.

[2] The B. F. Goodrich Co., Akron, O.

operator secures the thread by stretching it for a short distance on either side of the gage mark, wrapping it around the rod with the mark over the center of the rod in the horizontal plane, crossing one or more times over the first turn immediately above the gage mark, and slipping the free end in the notch at one end of the tee.

The appearance of the thread in place on the grip is shown in detail in Figure 2. The upper grip is held in a spring vise, *B*, while fastening the thread. The machine is arranged to return the lower head automatically to a position such that the center-to-center distance between grips is exactly 2 inches (5.08 cm.), the gage length used.

The pen is carried by a long arm of light-weight construction, *L*, which is counter-balanced by the weight, *N*, and operated by the light rigid metal link, *T*. The pen arm is hinged on an axis perpendicular to its pivot shaft so that the pen may be raised from the paper between tests. A wire of spring steel, *M*, is made a part of the pen-arm construction in such a way that it serves both as a spring to supply a light pen pressure and as a catch to hold the pen arm in the raised position. The wire is bent to slide in an L-shaped slot near the lower end of the arm. When the arm is raised, the end of the wire springs into the short end of the L-slot and holds the arm in that position until it is released by the operator. A vertical, flexible cord is supported behind the pen-arm link in such a way that a light jerk on the cord will move the link forward and raise the pen so that the catch may operate.

The same cord also serves to operate the ratchet device which is used to catch the machine's balance wheel at the instant of rupture of the thread under test. The ratchet spring is so light that the unbalanced weight of the wheel holds the ratchet dog in place until the wheel is advanced slightly, whereupon the wheel may be returned by hand to its zero position. This device was found necessary to prevent the rapid return and violent rebound of the balance wheel which would otherwise occur after failure of the test sample.

The connecting link, *T*, was made light enough to have very little effect on the position of the comparatively heavy balance wheel so that the same scale graduations may be used for any tensile range greater than 5 lbs. (2.26 kg.).

The chart coördinates are vertical straight lines for the elongation scale, and parallel curves which are concave upwards and slope upwards from left to right for the tensile scale. The vertical scale is made one-third as long as the maximum travel of the lower head of the machine by virtue of the 1:3 reducing-wheel motion by which the motion of the lower head is transmitted to it. The curved coördinates were laid out from a drawing of a "zero extension" curve to the full tensile capacity of the machine, using a rigid connection between upper and lower heads.

The chart carriage is a rectangular machined plate of 0.318-cm. (⅛-in.) steel supported from the smaller pulley by a fine music wire. A similar wire connects the arm carried by the lower head and the groove in the large pulley. The carriage is guided by accurately machined steel guides supported on a framework bolted to the main frame of the testing machine. A small spring steel clip, *U*, placed at the bottom of the guides, prevents the carriage from dropping out in the event of breakage of either wire.

The tensile capacity of the machine, although usually fixed at 2.26 kg. (5 lbs.), may be increased to 4.52 kg. (10 lbs.), or any suitable larger amount, by the addition of small weights on the threaded rod, *C*. Calibration is effected by adjustments of both sets of weights, the combination of weights adjustable at right angles to each other in the plane of the wheel with small adjustments of the indicator-needle angle, length of connecting links, and pen-radius, being sufficient to bring the device to its original calibration in case of derangement of the original settings.

In using the machine the operator locks the upper grip in a position such that the reading on the tensile scale is zero. The printed chart is then secured to the carriage by slipping its perforations over pins, *O*, one of which is adjustable, and fastening it under the clamp bar, *P*. The chart is adjusted so that its vertical coördinates parallel the guide bars and so that its zero force line will coincide with the zero position of the pen. The zero vertical position of the chart is adjusted by use of the adjustable anchor screw, *H*, to which the wire from the lower head of the machine is fastened.

With the upper head still clamped, the operator fastens the previously marked gage length of thread to the two grips. In installing the sample the operator stretches a small portion of the sample near the gage mark to somewhat less than the breaking elongation of the rubber as judged by the feel, lays the gage mark so that it will be horizontally over the center of the cross rod of the tee, and wraps it around the rod and upon itself in a figure eight fashion for four or more turns, always being careful that the turns cross each other slightly above the lower edge of the gage mark so as to leave the center of the gage mark in full view. The loose end of the thread is secured in the narrow slot at the end. Since the machine is arranged to stop the lower grip in the correct starting position, the installation of the correct gage length over the centers of the grips assures starting the test with zero tensile force on the rubber. The clamp is released by pulling the moveable jaw outward and turning it through 90 degrees. The pen is then lowered to the paper by pressing the end of the spring wire out of the short end of the L-slot in the pen arm.

The lower head is then set in motion in the usual way and the stress-strain curve is drawn automatically. At break, a jerk on the cord, *G*, releases the pen from the paper and catches the balance wheel near its maximum deflection. The wheel may then be returned under control to its zero position by the operator.

Illustrations of the performance of the modified machine are given in Figure 3, which is a photograph of a graph drawn by the machine. These curves demonstrate that slippage at the grips has been entirely overcome; otherwise there would be a larger spread between the individual curves for the test pieces from a given sample.

Microporous Rubber[1]

H. Beckmann[2]

MICROPOROUS rubber is a substance of the greatest fineness in physical structure. Externally, the material, according to its hardness, perfectly resembles firm pasteboard or soft leather. Even when greatly magnified no structural formation of any sort is disclosed in this substance. In spite of this, however, it is intersected by innumerable pores of extreme fineness, having a diameter of only 4/10,000 mm. Perhaps the extreme fineness and the number of the pores become somewhat clearer when it is considered that the pores have the size of the wave lengths of visible light or that there are 500,000 pores in one square centimeter. At the same time the substance has an unusually high power of absorption so that it is capable of taking up about 60 per cent of its volume in moisture.

Although this enormous subdivision can be observed neither with the naked eye nor under considerable magnification, yet just because of this fine subdivision the color is quite different from that usual for rubber. Microporous soft rubber is light yellow; whereas microporous hard rubber is light brown.

Microporous rubber is physically phenomenal in other respects in consequence of its extreme porosity. This becomes very apparent when it is subjected to a pressure of several hundred atmospheres. It then takes on the light brown color of solid rubber, loses all its porosity, and becomes perfectly transparent. As soon, however, as the material is exposed to hot vapors, even for a short time, it immediately regains its former porosity and color.

Microporous rubber is specially characterized in two ways: first, because it has pores of such infinite fineness, and second, as basic material it excels all other substances technically because of its high plasticity and extraordinary chemical resistance. Because of its peculiar and novel properties, this material should develop unusually far-reaching and manifold application, which cannot yet be outlined in detail. Of the many possibilities of application which are today already being exploited, mention may be made of the following:

Microporous rubber is used in diaphragms of storage batteries under the name of Mipor separators. In the chemical industry it is used in the large filter presses. Because of the resistance that microporous rubber shows against oil, it serves as a lubricating cushion and wick to supply the bearings of vehicles and machines uniformly with oil. Such oil-feeding has the special advantage that all the oil that gets onto the axle is thoroughly filtered by means of the microporous rubber. Because of its high power of absorption, sheets serve as blotters and can also be used for various sanitary purposes since the microporous rubber can always be sterilized by boiling.

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[1] Paper presented at the 1931 meeting of the Deutsche Kautschuk Gesellschaft.

[2] Professor at the Technische Hochschule, Hannover, Germany.

Very peculiar and attractive is its application as veneer. In thin layers it can be attached to metal plates of all kinds, eliminating their cold feeling. In addition it can be colored and polished as desired, and thus is peculiarly suited to covering walls, forming a handsome and at the same time extremely resistant finish. It excels wood veneers, especially as it is perfectly insensitive to moisture, thus when it dries it does not split and when wet it does not swell.

The material should be peculiarly suitable for use as wall coverings in hospitals and public buildings, especially as it can be given any color and made to resemble in appearance any kind of wood as far as grain is concerned. Bath mats of microporous rubber are superior to ordinary bath mats, because they absorb all moisture when stood upon and are always warm.

Especially as hard rubber, microporous rubber can be pulverized, and it is possible to use this fine powder for various purposes with great advantage; for example, as air and water filters. In this connection, because of the infinite fineness of the pores, every grain of the powder is intersected by fine pores; in fact, a mipor rubber dust particle of 1/100 mm. diameter is still pierced in its section by some 30 pores.

This development in German rubber technology seems destined to extend the uses in many lines hitherto unexpected and yet to be developed.

Action of Selenium in Rubber Mixings[1]

THE author summarizes his tests as follows:

1. The unusually great increase in the resistance to abrasion obtained by the addition of selenium, as observed by Boggs[2] and Follansbee, could not be confirmed.

2. In the presence of sulphur, selenium has a fairly powerful accelerating action on vulcanization; it, therefore, brings about an increase in the resistance to abrasion of slowly vulcanizing mixings that have not been accelerated, but not more so than is normally done by organic accelerators as a result of shortening the time of vulcanization.

3. Rubber vulcanized with selenium without sulphur shows no greater resistance to abrasion than rubber vulcanized with sulphur.

4. In mixings containing sulphur and organically accelerated, selenium causes a distinct increase of stretch-strain values; at the same time a volume contraction, observed by Kirchhof, takes place, causing raising of the specific gravity. In mixings accelerated with litharge, however, this stiffening does not take place, although volume contraction does.

The extent to which selenium affects the resistance to fatigue by flexing, which has lately been ascribed to it, will form the subject of further investigation.

[1] H. Rimpel, *Kautschuk*, May, 1931, pp. 94-97.
[2] While the author failed to confirm the results of Boggs and Follansbee in the matter, greatly increased resistance to abrasion due to selenium-sulphur vulcanization practice is demonstrating that it exists. EDITOR.

Rubber Bibliography

FLAME PRESSURE PROCESS FOR CARBON BLACK. A. W. Francis, *Ind. Eng. Chem.*, June 1, 1931, pp. 612-17.

SOME PROPERTIES OF CARBON BLACK. I. Adsorption. W. B. Wiegand and J. W. Snyder, *Ind. Eng. Chem.*, June 1, 1931, pp. 646-49.

EFFECTS ON VULCANIZED RUBBER COMPOUNDS OF IMMERSION IN BOILING WATER. K. J. Soule, *Ind. Eng. Chem.*, June 1, 1931, pp. 654-58.

RATE OF DEPOSITION OF LATEX ON POROUS MOLDS. H. W. Greenup, *Ind. Eng. Chem.*, June 1, 1931, pp. 688-91.

EFFECT OF STORAGE ON MILLED CRUDE RUBBER. C. M. Carson, *Ind. Eng. Chem.*, June 1, 1931, pp. 691-94.

RECOVERY OF RUBBER AND COTTON FROM UNCURED TIRE PLY SCRAP. C. S. Powell, *Ind. Eng. Chem.*, June 1, 1931, pp. 701-03.

X-RAY DIFFRACTION STUDY OF CHICLE. C. W. Stillwell, *Ind. Eng. Chem.*, June 1, 1931, pp. 703-06.

FURTHER X-RAY STUDIES OF GUTTA PERCHA AND BALATA. C. W. Stillwell and G. L. Clark, *Ind. Eng. Chem.*, June 1, 1931, pp. 706-07.

CONCENTRATED LATEX AND ITS INDUSTRIAL USES. F. W. Warren, *Trans. Inst. Rubber Ind.*, Feb., 1931, pp. 431-37.

USES OF CONCENTRATED LATEX. J. H. Carrington, *Trans. Inst. Rubber Ind.*, Feb., 1931, pp. 438-51.

DIFFICULTIES IN THE MANUFACTURE OF MECHANICAL GOODS. C. R. Quartley, *Trans. Inst. Rubber Ind.*, Feb., 1931, pp. 453-57.

ADSORPTION PROPERTIES OF CARBON BLACK. W. B. Wiegand and J. W. Snyder, *India Rubber J.*, June 6, 1931, pp. 747-51.

ELIMINATION AND UTILIZATION OF WASTE. C. P. Hawkins, *Trans. Inst. Rubber Ind.*, Feb., 1931, pp. 371-79.

SOME FACTORS INFLUENCING THE ELECTRICAL PROPERTIES OF SYNTHETIC RESIN MOLDING MATERIALS. E. A. Bevan, N. Strafford, and E. E. Walker, *Trans. Inst. Rubber Ind.*, Feb., 1931, pp. 384-401.

RUBBER WORKS' ACCOUNTANCY AND COSTING. C. Solomon, *Trans. Inst. Rubber Ind.*, Feb., 1931, pp. 410-18.

SOME CONSIDERATIONS OF LATEX PROCESSES. D. F. Twiss, *Trans. Inst. Rubber Ind.*, Feb., 1931, pp. 419-30.

USE OF PIGMENTS IN THE RUBBER INDUSTRY. F. A. Richter, *Farbe u. Lack.*, 1931, p. 135.

RECENT DEVELOPMENTS IN RUBBER FLOORING. Anon., *Bull. Rubber Growers' Assocn.*, May, 1931, pp. 227-30.

WHITE PIGMENTS. F. H. Cotton, *India Rubber J.*, May 23, 1931, pp. 675-76; May 30, pp. 711-12.

APPEARANCE OF ATMOSPHERIC CRACKS IN STRETCHED RUBBER. A. van Rossem and H. W. Talen, *Kautschuk*, May, 1931, pp. 79-86. (To be continued.)

CONCERNING IMPREGNATIONS. E. A. Hauser, in collaboration with M. Hünemorder, *Kautschuk*, May, 1931, pp. 89-94.

QUESTION OF THE ACTION OF SELENIUM IN RUBBER MIXINGS. H. Rimpel, *Kautschuk*, May, 1931, pp. 94-97.

INNER TUBE FILLERS. J. B. Meyer, *Kunststoffe*, May, 1931, pp. 103-04.

PLASTICATION OF RUBBER. F. Jacobs, *Rev. gén. Caoutchouc*, Apr., 1931, pp. 15-24. (Continuation.)

ACCELERATORS OF VULCANIZATION. F. Jacobs, *Caoutchouc & gutta-percha*, May, 1931, pp. 15522-25. (Continuation.)

OPEN STEAM VULCANIZATION IN TALC. A. Blondel, *Caoutchouc & gutta-percha*, May, 1931, p. 15526.

USE OF ALFA FIBER IN MANUFACTURED RUBBER. *Caoutchouc & gutta-percha*, May, 1931, pp. 15527-30.

PROSPECTS IN TIRE CONSTRUCTION. A. Frohlich, *Gummi-Ztg.*, May 15, 1931, pp. 1335-37, and May 22, pp. 1376-78.

RESULTS OF SOME MANURING EXPERIMENTS CARRIED OUT ON THE GOVERNMENT RUBBER ESTATE SERPONG. W. C. van Heusden and J. S. Vollema, *Arch. Rubbercultuur*, Mar., 1931, pp. 125-39. English summary, pp. 140-46.

EXPERIMENTS AND OBSERVATIONS IN CONNECTION WITH THE CONTROL OF OIDIUM IN *Hevea Brasiliensis* DURING 1930. A. Pfaltzer, *Arch. Rubber-cultuur*, Mar., 1931, pp. 147-69. English summary, p. 170.

A. C. S. Buffalo Meeting

THE eighty-second meeting of the American Chemical Society will be held in Buffalo, N. Y., August 31 to September 4. The tentative program includes a symposium on "New Research Tools" under the auspices of Division of Industrial and Engineering Chemistry.

Bonding Rubber to Fabrics

IN THE manufacture of automobile tires, belting, pressure hose, and certain types of insulation, it is customary to coat or impregnate the fabric with rubber or rubber solution. While this treatment, properly carried out, effectually waterproofs the fabric, it does not appreciably increase its tensile strength, and the adherence of the rubber is rather defective.

A new method is said to give greatly improved results in the treatment of fabrics for the construction of this type of goods.

According to this method the fabric is first treated with a preliminary impregnating solution or varnish yielding a flexible film of the phenol-methylene resinoid type.

This term refers to the infusible transformation product of the reactive resins of the phenol-methylene type or other artificial resinoids rendered flexible by any suitable method. Ordinarily the hardening or polymerization of the reactive resin is effected in advance of the application of the rubber mixing applied to the fabric either as a plain coating or with the necessary ingredients and vulcanizing agents. Data from U. S. Patent No. 1,776,879, Sept. 30, 1931.

A MECHANIC WAS CHANGING A SCREW cap on an 84-inch mixing mill, and he asked the mill man to help him. The mill man used his finger for the dowel pin and the cap slipped, resulting in the amputation of the end of the finger. *Rubber Section News Letter*, N. S. C.

Technical Communications

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AgeRite Gel

AGERITE GEL is a new addition to the AgeRite group of antioxidants. It is a combination or composition consisting of ditolylamines and a selected petroleum wax. The following is a description of its properties.

It is a soft waxy solid which melts at about 65° C. (149° F.) to a clear oil which does not separate on cooling.

Color, pale grayish white.

Odor, like that of ditolylamines, not unpleasant.

Toxicity, no toxicity noted in 18 months of laboratory and factory work.

Processing properties. Acts to some extent as a rubber softener; dissolves easily and in high concentrations in the rubber; does not bloom when used in amounts up to and over 2 per cent on the rubber; dispersibility is high and allows of no possibility of solid particles serving as nuclei for cracking failures.

It is not an accelerator by itself and has but a slight activating influence on Captax and similar accelerators.

In gasoline and like cements no separation of solids occurs.

It is an active anti-flex-cracking agent.

It is an active anti-sun-cracking agent. The notably good resistance to sunlight cracking is not caused by the waxy constituent alone, but is due more in particular to the ditolylamines.

It is a strong general antioxidant.

It has good heat-resisting properties but for the best results in this direction it should be used with AgeRite powder.

It does not stain during cure and discolors white and colored stocks less than most strong antioxidants.

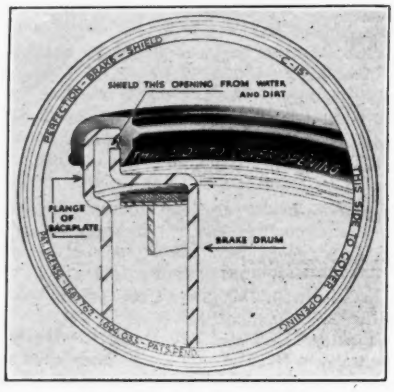
It imparts to the finished product a fine, smooth, glossy finish.

On account of its desirable physical state, it lends itself admirably to easy handling in the compound and mill rooms. Data from R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y.

Rubber Brake Shield

BRAKE drums screech for protection from grit and water that have entered through the opening between the brake drum and the flange of internal brakes. The effect of the grit is to score the brake drum, grind into the brake lining, and cause it to wear away much faster than it should. The presence of the water rusts the levers and release springs. From the grit and worn linings comes the screeching when the brakes are applied.

Naturally the way to silence the noise is to prevent the damage by excluding the grit and water. This can be effectively done by application of a brake shield that will make the internal brakes waterproof and dirtproof.



Perfection Brake Shield

The accompanying illustration pictures such a shield made of specially compounded rubber to withstand oil and grease and to give long service. This shield can be installed in less than 30 minutes on most cars and trucks having wire or disk wheels or the newer wood wheels, while they can be applied in 10 minutes as the brakes are being relined.

The shields prevent frozen brakes, slipping or dragging brakes, and scored drums. They insure smooth positive braking power under all weather conditions and greatly increase the life of brake linings. Data from General Tire & Rubber Co., Akron, O.

Barak in Combination

BARAK used in conjunction with Altax is a very interesting combination because it produces stocks having but little tendency to scorch under normal factory conditions, excellent physical properties, and a remarkably flat modulus curve, much flatter than can be obtained with either Captax, Altax, or Thionex alone.

The outstanding feature of compounds that contain Barak in combination with Thionex, Captax, Altax, or other acidic accelerator is their flat modulus curve. Stocks that are overcured from 100 to 400 per cent have the same hardness and other physical properties as when correctly cured. When Barak is used in combination with Captax or Altax, stearic acid is not required although it may be used in reasonable amounts without affecting the rate of cure. Combinations of Barak with Thionex, Captax, Altax, or other accelerators of that type are invariably more economical to use than the corresponding accelerator alone. Data from E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Technogram No. 1

MILLING crude rubber on a hot mill softens the rubber more effectively while it is on the mill, but produces a tough rubber on cooling. On the other hand more time is required on a cool or cold mill to sheet the rubber satisfactorily for compounding, but the softness obtained by this method is more lasting and permanent. Data from R. R. Olin Laboratories, Akron, O.

Air Cooled Tire

A DISTINCT advance in pneumatic tire tread construction is embodied in the triple tread air cooled tire. It has three treads which are not simply superimposed on each other but built integral as a ventilated unit. In service the progressive wear brings each non-skid tread successively into road contact. Thus the total non-skid tread is 100 per cent thicker than the heaviest tread in ordinary pneumatic tires.

Heating effect and inflexibility are overcome by special air cooled construction. This consists of two rows of transverse holes that pierce the tread from side to side. One of these rows lies directly below the external anti-skid tread, a second row directly below the first. The individual holes are staggered to insure the largest amount of cooling surface, slowest wear, and longest anti-skid life. The cooling effect results from the movement of air into and out of the ventilating holes caused by the flexing action of the tire.

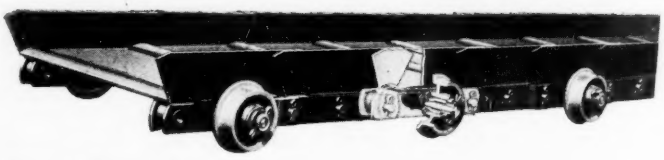
The force of the air movement through the holes expels clay, gravel, or any foreign material keeping the cooling areas clean and effective under all road conditions. This construction not only has cooling effect but improves riding quality as well. Data from Seiberling Rubber Co., Akron, O.

Plastic from Sugar

A PLASTIC material derived by chemical conversion of sugar has recently been announced by the Industrial Sugar Products Corp., New York, N. Y. The procedure provides an unlimited outlet for sugar, adds a new process to chemical industry, and gives a cheap raw material to the plastic trade.

The products of the process and its variations are hard, brilliant, and glass-like, flexible, and transparent, or a celluloid that is non-inflammable. The material in powdered form is adaptable for molding into articles for the usual variety of purposes for which other synthetic resin plastics are now used.

New Machines and Appliances



Brown & Rehbaum Service

Rex Apron Conveyer

Apron Conveyers and Feeders

ALL metal apron chain conveyers and feeders find application wherever hot, heavy, or wet material requires to be moved either indoors or outside, as for example in conveying scrap rubber to storage, moving ground scrap in reclaiming works, molds, etc., in tire plants, etc.

In the illustration is shown a unique method of equalizing saddles for the attachment of conveyer aprons to the chains that pull the load. By this device apron carrying and pulling loads are applied only at the center line of each chain, thus avoiding eccentric or side loads. The equalizing saddles rest directly on the chains being held in place by either rods or pins extending through the chains and saddles. By this method of connection the load is distributed equally to both side bars. The chain draws straight and true and its life is practically doubled.

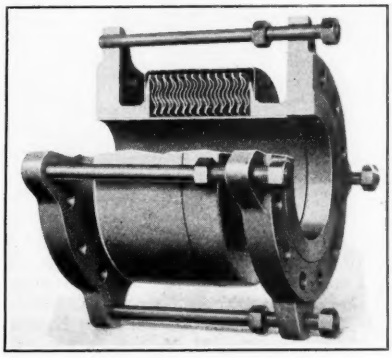
The roller supporting rods are fitted with hardened bushing sleeves locked to the rods. Both rollers and sleeves are readily replaced without delay to operations and without distributing the rest of the equipment. The apron design is especially suited for free running materials without leakage at the sides. Chain Belt Co., Milwaukee, Wis.

High Pressure Expansion Joint

IT IS essential that expansion joints be installed at intervals in all pipe lines carrying steam, air, water, gas, oil, or other hot fluids, in order to take care of the material changes in length caused by temperature changes. The joint illustrated was developed during years of research in an effort to produce an expansion joint which would solve all pipe expansion problems.

This joint permits free movement of the piping without strain, through the use of a flexible heat treated nickel steel expansion element, welded to forged steel flanged heads, which are guided relative to each other to permit longitudinal movement only. The expansion element is a completely welded assembly of corrugated nickel steel disks. After welding by the atomic hydrogen process the complete element is heat treated to obtain uniform quality, maximum strength, and freedom from all local stresses because of welding. This construction, requiring no packing, is absolutely leakproof.

In operation the movement of the expansion joint is analogous to the action



"Flexo Disc" Expansion Joint

of a coil spring because the expansion and the contraction of the piping is taken up by the elastic deflection of the plates. Since, therefore, the stresses are entirely within the elastic limit, the life of the element is practically unlimited.

This joint is particularly suitable for power plant piping, process steam lines to vulcanizers, presses, driers, etc., and other similar piping used in rubber plants since it eliminates leakage troubles, enforced shutdowns, and other repair or maintenance work. Croll-Reynolds Engineering Co., Inc., 17 John St., New York, N. Y.

Pneumatic Cycle Controllers

EFFICIENCY of operation and uniformity of product require the use of automatic control of process cycles in the manufacture of rubber articles. In the operation of machines which are required to perform according to a definite sequence and which can be controlled by valves, it is found that the best results are obtained by diaphragm operated valves actuated by a pneumatic cycle controller.

A very large proportion of such processes as the curing of rubber products are such that the sequence of the several events which terminate the cycle is the reverse of their order at the beginning of the cycle. Where this condition holds, the operation may be controlled by an instrument (Figure 1) in which a number of pilot valves are actuated in turn by a motor-driven cam. This cam may be made adjustable within certain limits, and speeds are determined by suitable gearing between the synchronous motor and the cam-shaft.

Where utmost flexibility is required, and the different events in the cycle overlap by varying degrees, rendering control by a single cam impracticable, there is available the instrument shown in Figure 2. Here several individual cams are mounted on a common shaft, and each is adjustable through a wide range, both as regards the duration of its influence in the cycle and its position in the sequence of events. The pneumatic features of this instrument are identical with those of the single cam controller.

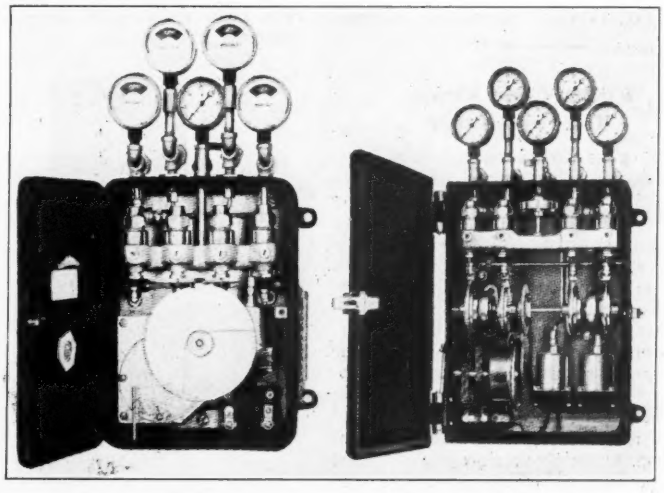
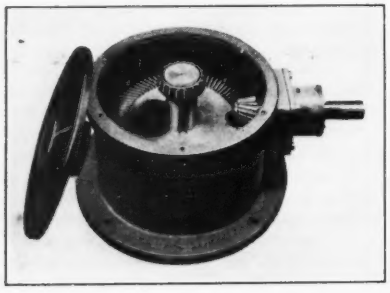


Fig. 1. Single Cam. Fig. 2. Multiple Cam.
Bristol Pneumatic Cycle Controllers

These instruments do not perform the function of regulation, but may be used in conjunction with any pneumatic or electrical regulating devices for pressure, temperature, etc. With suitable accessory equipment in the form of relay valves, pressure switches, safety stops, etc., they readily lend themselves to those types of control where interlocking or safety stops are necessary. The Bristol Co., Waterbury, Conn.

Vertical Speed Reducer

A NEW speed reducer of vertical spiral bevel gear type is here pictured. It is smooth and noiseless in operation. The gears are made of chrome nickel of spiral bevel type to secure greater efficiency, as this improved tooth form provides more teeth in constant contact and a greater tooth bearing or pressure area in each tooth of given size.



James Speed Reducing Unit

The shafts are made of 40 carbon steel and roller bearings provided on both drive and driven shafts.

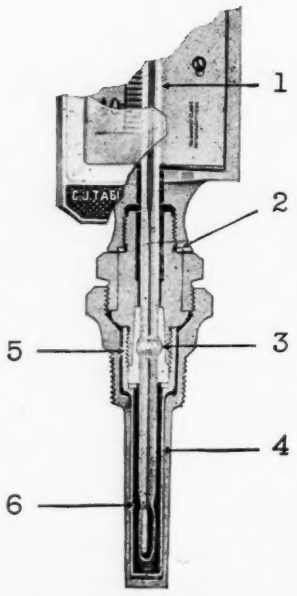
Where large ratios of reduction are required, this type of reducer is made integral with a planetary reduction unit so that all ratios from 8 to 1 to 1,000 to 1 are available. They are made in sizes from ½ to 100 h.p.

A well-designed housing prevents oil leakage and keeps dust and dirt from filtering into the unit, forming a neat, compact drive for use whenever vertical, up or down, driving is required. D. O. James Mfg. Co., 1114 W. Monroe St., Chicago, Ill.

Snap Case Front Thermometer

THE glass fronts on industrial thermometers get dirty and frequently fog up. A new snap case has been designed to make cleaning easy and to prevent breakage of the glass front. A tongue at the top of the case fits snugly in a groove in the front so that in opening or closing it cannot slip and fall.

Other constructural features of this thermometer are indicated by numbers in the accompanying illustration and described as follows: (1) Hespe glass easy to read; (2) Connecting piece, locked to case by a special split spring washer; (3) Asbestos packing, uniformly compressed on glass stem prevents movement of the tube with reference to scale; (4) The Monel bulb chamber is thin enough to allow quick conductivity, yet rugged and non-corrosive; it cannot amalgamate with the mercury filling; (5) Left-handed thread on bulb chamber prevents loosening if case is turned in removing thermometer from its socket; (6) Mercury filling in bulb chamber completely surrounding bulb insures transmission of heat with split second rapidity. C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y.



Tagliabue Thermometer

Golf Ball Tester

THE importance of accuracy of form and resilience essential in golf balls can be guaranteed only by an instrument that is specially designed for the purpose.

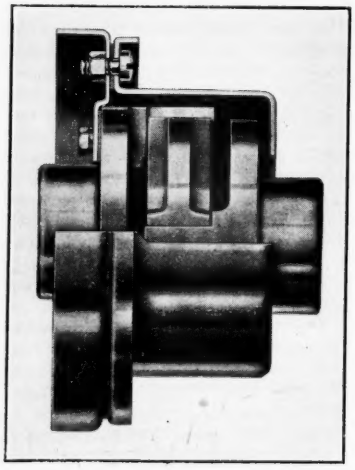
The machine here pictured was developed for testing or checking golf balls in the course of manufacture to determine that the cores are wound uniformly and to a given amount of resiliency. The device applies a load by a dead weight and indicates upon a dial gage the compression under the load.

Olsen Tester

The tester is very easily operated, for it is controlled entirely by a small knurled head shown in the right of the picture. The machine is designed for bench use. Its dimensions are: Length, 8½ inches, breadth, 10½ inches, and height, 15 inches. Its net weight is 50 pounds. Tinius Olsen Testing Machine Co., Philadelphia, Pa.

Cross-Type Coupling

IT IS generally a fact that small coupling installations in both industrial and domestic service are subject to more neglect than larger ones. Frequently small couplings are operated much beyond their intended limits. The new cross-type coupling is designed with two forged steel flanges having prongs and a light center cross similar in many respects to the well-known Oldham coupling used for many years in general industrial service. The improved form handles out of center misalinement better than most forms of couplings because it maintains its large, evenly loaded, and well lubricated bearing areas unchanged under all operating conditions.



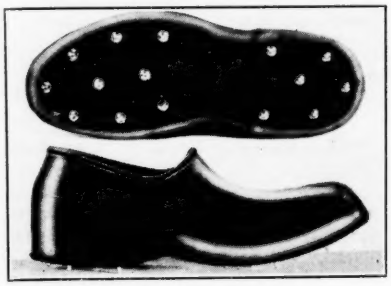
Francke Flexible Coupling

It provides the least resistance to endwise float and takes care of a limited amount of angularity.

The pressed steel grease case provides an adequate reservoir for lubricant. A clearance hole at the end of the grease case permits as much as $\frac{1}{16}$-inch axial or cut of center misalinement. The grease case also acts as the limit stop. When the clearance is equal all around the hub, the shafts are in good alinement. This casual check can be made without disturbing the coupling or the machines. The two flanges of the grease case can be separated for checking more accurately the alinement or for packing with grease. For usual installations ordinary cup grease should be used, and for higher temperatures a somewhat harder grease should be used.

This coupling is simple and easy to install. Its lubrication is continuous but requires no more attention than the usual ball bearing, or once or twice in a year. Smith & Serrell, 20 Washington Place, Newark, N. J.

New Goods and Specialties



Rubber Dew Shu

Golfer's Overshoe

RAINY weather, of course, is the bane of every golfer. If, however, he braves the tempest, what about his feet? Wet grounds mean insecure footing, poor game, and the danger of a cold from saturated feet. Should the player wear his regular golf shoes in such weather, they are ruined. If he sports rubbers, the danger of slipping is great. Besides slippery grounds spoil his game in many ways.

Now, however, a golfer has designed for fellow golfers an overshoe that is said to eliminate all these difficulties. The Dew Shu, as it is known, is an overshoe with hob nails vulcanized right into the rubber. All the golfer has to do is put on his most comfortable pair of old shoes; then slip over them his Dew Shus.

This new type of footwear, here illustrated, is a storm rubber with a heavy sole into which the hob nails are vulcanized. The advantage of this feature of construction is that holes made from inserting the nails after vulcanization are not present; thus the soles cannot leak. The manufacturer claims that these shoes will stand at least two years or more of hard wear. The color is black, and the sizes run from 6 to 12. National Crafts Co., 20 W. 27th St., New York, N. Y.

Rubber in Respirator

ONE of the health essentials in industry for the worker is, he should breathe pure, clean air all day. But in many factories harmful fumes are spread. To overcome this menace Willson Products, Inc., Reading, Pa., designed the Type B Bag Respirator, here illustrated.

The bag fits inside of and is rolled back over the anatomically shaped form, assuring a close, comfortable, air-tight contact. The lightweight ball-shaped spring inside the bag makes possible maximum breathing area at all times. The respirator is light in weight, comfortable, and efficient. No part touches the face except the soft bag filter which rolls back over the anatomically shaped rubber form.

All parts of the respirator are replaceable without tools. The bag filters, moreover, are washable and can be used many times.

Interference with speech or breathing is prevented by the unusually large area of breathing space. Full, free vision is possible, and eyeglasses or spectacles can be worn.

Willson Bag Respirator—Type B

Light acid and alkaline fumes encountered in various industrial operations are neutralized by dipping the bag in specially prepared chemical solutions. For dry, dusty atmospheres the dry filter is used.

New Basket Ball Shoe

THE Cambridge Rubber Co., Cambridge, Mass., has a new number, the "Spotlite" basket ball shoe. Its chief features are the Sneex arch lift and the ankle strap, the latter designed to eliminate the use of adhesive tape which most players wrap about the ankle to prevent chafing and blisters. The new strap, built into the shoe, holds the foot firmly in place. The toe is ventilated, and the sole has inlays of tread stock at the points of greatest wear, and also rubber sponge arch and heel supports.

Rubber Powder Puff

SOFT and sponge rubber are utilized to provide a sanitary powder puff that is attractive in appearance, readily washed or cleaned, and so made that the powder contained in it is kept clean and ready for instant use at all times. The puff proper consists of a suitable powder carrying material such as chamois secured to each flat face of a disklike rubber sponge; or, the rubber sponge may be loosely carried between two disklike sections of the chamois joined together along their meeting edges. This pad is readily washable; and as it is provided with a sponge interior, will dry quickly and be ready again for use.

Another feature of this puff is the case in which the pad is contained. The former is of soft rubber, round or disk shaped, with a base and a mouth surrounded by a lip or flange. A flat, circular cover is cemented to the flange. Since the powder is carried upon the pad, the flap of the mouth is opened to expose the pad, which may then be applied to the skin. Or the entire pad may be easily removed from the container. The latter is fashioned so that it may be reversed if one side becomes soiled. Powder may be carried in this receptacle, if desired, so that the pad always will be supplied. The receptacle may also be used to tap the skin gently as is usually done with a puff to cause the skin to take up the powder. Thos. E. Gjorup, Chicago, Ill.

Rubber Radio Pillow

IRKSOME earphones and loudspeakers which may disturb others nearby have been eliminated by a device designed by the Engineering Products Division of the RCA Victor Co., Woolworth Bldg., New York, N. Y., for use in hospitals, Pullman cars, steamer chairs, etc., but not for the home. This product, known as a radio pillow, of regulation hospital size, is fashioned of specially selected sponge rubber in which is concealed a radio reproducing unit connected with a centralized radio system, that can be heard only when the head rests on the pillow.

Listening In on a Sponge Rubber Radio Pillow

Editor's Book Table

NEW PUBLICATIONS

"Barak. Laboratory Report No. 153." E. I. du Pont de Nemours & Co., Wilmington, Del. This report issued by the Dyestuffs Department, Rubber Laboratory, is devoted to further tests on Barak in combination with Thionex, Captax, and Altax and is supplementary to reports Nos. 143 and 151, which covered the results of tests on Barak when used in combination with Thionex, Captax, and Di-ortho-tolylguanidine.

"Industrial Accident Statistics." National Safety Council, Inc., 20 N. Wacker Dr., Chicago, Ill. The 1931 edition of this publication contains the record of injuries in 28 American industries in 1930 and previous years. The rubber industry is in the front rank of industries having the least accidents. Injuries were less frequent and less severe, and fatalities were fewer, in establishments manufacturing mechanical rubber goods than in tire plants.

"Garlock 430 Chevron Packing." The Garlock Packing Co., Palmyra, N. Y. In this four-page bulletin the construction and mode of application of this unique automatic piston rod packing is illustrated and described. It is made in grades for both hydraulic and high temperature service.

"The Black Art of Rubber Compounding Chat No. 19." Binney & Smith Co., 41 East 42nd St., New York, N. Y. Reviews ten years' evolution of Micronex and discusses the properties and compounding values of standard and special grades of Micronex for special purposes.

"Royle Perfected Tubing Machine No. 1 Worm Geared." John Royle & Sons, Paterson, N. J. Bulletin No. 378 outlining the features of this effective machine which is particularly adapted to manufacturing small tubing, solid shapes such as windshield rubber, and to covering electric wire and tire beads.

"Lead Encasing Presses." John Robertson Co., Inc., 123-131 Water St., Brooklyn, N. Y. This 4-page bulletin shows cable factory installations of lead encasing presses and individual illustrations of the press and accessory equipment of hydraulic pump, lead melting pot, and lead stripping machine.

"A Guide to the Literature on Rubber." Letter Circular 305. Department of Commerce, Bureau of Standards, Washington, D. C. This is a 13-page mimeographed memorandum prepared to assist readers unfamiliar with rubber technology in obtaining recent and authentic information relating to the production, manufacture, and properties of rubber and rubber products. The list includes only recent books, current periodicals, and other publications which are liable to be readily accessible and useful to American readers. Only casual reference is made to patent literature.

BOOK REVIEWS

"Modern Progress in Rubber Compounding." By Charles R. Boggs. Simplex Wire & Cable Co., 201 Devonshire St., Boston, Mass., 1931. Paper, 28 pp., 6 by 9 inches.

This is a reprint for complementary distribution, of a paper presented by the author before the Signal Section, American Railway Association, New York, N. Y., May 13, 1931. The paper gives a condensed and rapid sketch of crude rubber sources, impurities, physical structure, chemical composition, and vulcanization. The review covers compounding in general, the improvements due to the use of carbon black, the commercial use of latex, selenium, organic accelerators, antioxidants, accelerated aging tests, and physical testing.

Electrical properties of crude and compounded rubber are discussed, also improvements, in rubber insulating compounds. Types of specifications are reviewed and the advantages of the performance type clearly shown and clinched with the statements that "This type of specification is an insurance, not an obstacle. The way to take advantage of modern progress and to do it automatically is to purchase on performance specifications."

"Studies in the Artificial Control of Raw Material Supplies." By J. W. F. Rowe. No. 2 Rubber, March, 1931. The London and Cambridge Economic Service, London School of Economics, Houghton St., Aldwych, London, W. C. 2, England. Paper, 87 pages, 8⅜ by 10¾ inches. Appendix.

This study of the artificial restriction of rubber production under the Stevenson Plan reviews the historical background that invited restriction of rubber production. The events of the restriction period are recited and their effects shown from the points of view of producer and consumer.

The Dutch native rubber industry and the vital difference between estate and native culture are evaluated in terms of yield per acre and output to be expected at different prices. The final chapter of the study concerns the present and future of rubber production showing that native produced rubber will ultimately lose its market importance in competition with the revolution in technique now in progress on the estates. The appendix includes 13 statistical tables on production, stocks, and prices.

"Dyke's Automobile and Gasoline Engine Encyclopedia." By A. L. Dyke. Sixteenth edition with inserts on Ford Model "A" car and Model "AA" truck. Published by The Goodheart-Willcox Co., Inc., Chicago, Ill., 1931. Flexible cloth, 1339 pages, 6½ by 9½ inches. Indexed and illustrated. Price $7.50.

This reference book of the automobile and gas engine is compiled for the student, repairman, and car owner. Thus its purpose is to explain the principles of all parts, to point out the differences in construction and design, and to instruct in testing, adjusting, and repairing each unit of the automobile.

The subjects added to the sixteenth edition represent the very latest automobile engineering refinements and developments, and may be classified as follows: Types of automobile chassis, types of engines and accessories which have been universally adopted as standard equipment on cars, and also specifications and data.

"The Story of the Airship." By Hugh Allen. Foreword by P. W. Litchfield. Seventh Edition, 1931. The Goodyear Tire & Rubber Co. Library edition, boards, 84 pages 6 by 9 inches. Illustrated. Price 50 cents.

This book is the first attempt to cover the entire story of lighter-than-air craft in simple language. It explains the classifications of airships, non-rigid, semi-rigid, and rigid; the part played by the free balloon; the military usefulness of airships; the effect of weather conditions; the importance of helium gas and duralumin. There is a fairly complete description of the new ship being constructed at Akron for the United States Navy, twice the size of the *Graf Zeppelin*, and to be launched early next August. The unusual hangar in which it is being assembled is also described. The appendix contains much interesting data concerning the Goodyear-Zeppelin airship docks, balloon races, etc., concluding with a bibliography.

American Rubber Executives

The brief personal sketches to be published on this page will eventually form a valuable record of the part played by American rubber executives in the progress of the industry. Presidents, vice presidents, secretaries, treasurers, sales and advertising managers are invited to send us their biographical data.

John Warren Bicknell, v. pres., gen. mgr. *b.* Dec. 5, 1886, Malden, Mass.; Oxford prep. sch., Malden; Harvard U., 1909; C. D. Parker & Co., Boston, Mass., 1909; General Rubber Co., United States Rubber Co., subsidiary, 1910; mgr., United States Rubber Plantations, Inc., serving 10 years, chiefly in Sumatra, later sec., treas., v. p. of Co. *Author:* "Botanical and Chemical Development in the Plantation Industry." *Member:* Harvard and Lotus Clubs, New York, N. Y., and other societies. *Address:* U. S. R. Plantations Co., Inc., 1790 Broadway, New York, N. Y.

Alfred Hume Branham, gen. mgr., dir., v. p. *b.* Jan. 19, 1896, Nashville, Tenn.; Branham and Hughes Military Acad., U. of Miss., Vanderbilt U.; enlisted U. S. Marine Corps, 1917; year's service overseas; B.A., Vanderbilt U., 1920; commandant B. and H. Mil. Acad., 1920; with Caldwell & Co., bankers, Nashville, 1926-29; gen. mgr., Murray Rubber Co., Trenton, N. J., 1929; since dir. and v. p. *Member:* Beta Theta Pi, Kiwanis Club, Mason, Capt. U. S. Marine Vol. Reserve. *Address:* Murray Rubber Co., Trenton, N. J.

Charles E. Cannon, mgr. sales personnel. *b.* 1888, Ohio; Mt. Union Coll., 4 yrs.; joined Goodyear T. & R. Co., Akron, O., 1912; tire bldg. dept., service dept., adjuster (coast to coast), dealers' rep. on complaints, mgr. office employment, mgr. sales personnel Calif. Goodyear, and traveling organization in entire field. *Member:* University Akron, coll. fraternities, and Masonic bodies. *Address:* Goodyear T. & R. Co., Akron, O.

Frank L. Hockensmith, sales mgr. *b.* 1890, Wadsworth, O.; grammar, high schs., Whittenberg Col.; B.S., Akron U., 1914; B. F. Goodrich Rubber Co., Akron, sales dept., 1914; Goodrich mgr. Texas dist.; asst. branch mgr., Goodrich, Detroit, Mich.; branch mgr., Goodrich, Los Angeles, Calif.; Southwest dist. mgr., Pacific Goodrich Rubber Co. *Member:* Beta Theta Pi, Mason, Shriner. *Address:* Pacific Goodrich Rubber Co., 5400 E. 9th St., Los Angeles, Calif.

Edward E. Huber, sec., dir. *b.* July 14, 1855, Newark, N. J.; private schs., bus. college, 1871; Koch Sons & Co., Newark, 1871; Eberhard Faber, mfr. lead pencils, stationers, rubber sundries, Newark, 1875; mgr. Faber factory, 1879; Eberhard Faber Pencil Co., sec., dir., 1898; same position with Eberhard Faber Rubber Co., 1902; gen. mgr. Eberhard Faber. *Member:* sec. many years ex. com. Rubber Sundries Mfrs. Assn. and v. p. exec. com. Rubber Sundries Div. Rubber Assn. of America; pres. Village of Pelham, N. Y., 1912-15; v. pres., dir., Greenpoint, N. Y. Nat. Bank, 1912-26; many years sec. N. Y. Credit Men's Assn.; v. pres. Nat. Assn. Stationers & Mfrs., 1915; pres. Stationers' & Publishers' Board of Trade, 1922-27. *Address:* Eberhard Faber, 200 5th Ave., New York, N. Y.

Robert C. Kelley, purchg. agt. *b.* Jan. 2, 1895, Dorchester, Mass.; A.B., Harvard U., 1917; reporter Boston papers; 14 mos. army service, supply dept.; Converse Rubber Shoe Co., 1918, specializing in supplies, salvage; planning heel and sole div., Hood Rubber Co., 1925-26; Converse Co. (including Hodgman Co.), purchg. agent and head of plant maintenance, 1926; nat. chrmn. textile com. National Assn. Purchg. Agts., 1930; co-author book, "Material Planning and Control," many trade journal articles on rubber, buying, etc.; taught buying, storekeeping, commodity analysis, ev'g. div. Northeastern U., Sch. of Commerce & Finance. *Member:* American Legion, KGX Club of Harvard, New England Purchg. Agts. Assn., Mason, Knight Templar. *Address:* 503 Walnut St., Newtonville, Mass.

Herbert King, pres., eng. *b.* Nov. 1, 1902, Bloomfield, Iowa; Iowa State Coll., elec. engrg., 3 yrs.; engrg. dept. Iowa Ry. & Light Co., 1923-24; const. foreman, Follansbee Bros. Co., Toronto, O., 1924-25; mech. goods div., Goodyear T. & R. Co., Akron, O., 1925-27; production superviser mech. goods, Gates Rubber Co., Denver, Col., 1925-28; founder, pres., gen. mgr., United Rubber Corp., San Francisco, Calif., 1928. *Member:* Kappa Sigma. *Address:* United Rubber Corp., 37 Arkansas St., San Francisco, Calif.

Frank H. Mason, dir., acting chrmn. *b.* Dec. 29, 1852; joined B. F. Goodrich Rubber Co., Akron, O., 1879; gen. supt., 1882; co. dir., 1887; works mgr., 1893; member board of control, 1901; v. p., 1907; v. chrmn. and acting chrmn. *Address:* B. F. Goodrich Rubber Co., Akron, O.

Clyde B. Mitchella, engr., gen. mgr. *b.* Akron, O.; Akron pub. sch., eng. grad., Case Sch. Applied Science; several years with B. F. Goodrich Rubber Co., Akron; chief engr., Republic Rubber Co., Youngstown, O., 1926-31; leader in Rotary Club, Youngstown; gen. mgr., Adamson Machine Co., rubber and other machinery, Akron, O., 1931. *Member:* Eng. Com. Rubber Sec., National Safety Council. *Address:* Adamson Machine Co., Akron, O.

John Vaughan Mowe, pres. *b.* 1875, Oconomowoc, Wis.; high sch., 1893; Creamery Package Mfg. Co., Chicago, Ill., 1901-03; junior partner, Henry Knight Co., wholesale wooden ware, Chicago, Ill., 1904-05; branch mgr., Firestone T. & R. Co., Detroit, Mich., 1906-12; special rep. Goodyear T. & R. Co., 1913-14; asst. gen. sales mgr., Kelly-Springfield Tire Co., Cleveland, O., 1915-19; v. p., dir. gen. sales mgr., Kelly-Springfield Tire Co., New York, 1920-23; promoted and developed Fairchild process and pioneered inner tire mold, 1923, forming Twemo Co. to market same and made pres., 1925. *Member:* Lawrence Park Golf Club, Detroit Athletic Club, and the New York Athletic Club. *Address:* 250 W. 57th St., New York, N. Y.

Frank E. Titus, gen. sales mgr., eng. *b.* July 22, 1884, Painesville, O.; gram. sch., Cleveland, O.; high sch., Bellevue, O., 1903; Nickel Plate Railroad Co., 1903; Ohio Cultivator Co., 1905-06; eng. asst., B. F. Goodrich Co., Akron, O., 1906; asst. W. O. Rutherford, Buffalo, N. Y., branch mgr., 1907-14; branch mgr., Denver, Col., 1914; branch mgr., Pittsburgh, Pa., 1914-15; branch mgr., Buffalo, 1916-17; asst. mgr., home office, foreign sales, later dir. of latter, 1918; v. p., The International B. F. Goodrich Corp., 1918-1925, and New York dist. mgr. of same, 1926-7; foreign trade div., Rubber Ass'n. of America, 1924; gen. sales mgr., Pacific Goodrich Rubber Co., Los Angeles, Calif., 1928. *Member:* Akron City and Portage Country Clubs, Akron, O., and Masonic bodies. *Address:* Pacific Goodrich Rubber Co., Los Angeles, Calif.

Leroy Tomkinson, gen. supt., v. pres. *b.* Dec. 13, 1895, Akron, O.; South Akron High Sch., sci. deg. Akron U.; special work, Goodyear T. & R. Co., Akron, O.; foreman truck tire dept., 1926; mgr., Goodyear Flying Squadron, 1928; gen. supt., v. p., Goodyear Calif. Co., 1930. *Member:* Mason, Shriner. *Address:* Goodyear Works, 6701 S. Central Ave., Los Angeles, Calif.

Dales D. Tripp, v. p., gen. sales mgr., eng. *b.* Aug. 22, 1880, Mt. Kisco, N. Y.; Lowell High Sch. and Coggswell Coll. (engrg.), San Francisco, Calif., 1900; joined Pioneer Rubber Mills, San Francisco, 1900; office clerk, store and road salesman, branch mgr., Seattle, Wash., and New York, N. Y.; v. p. and gen. sales mgr. *Address:* Pioneer Rubber Mills, San Francisco, Calif.

W. C. Winings, sales mgr. *b.* 1893, Indianapolis, Ind.; high sch. and coll.; salesman, sales superviser, sales instr., branch mgr. tire dept., asst. sales mgr., and mgr. mech. rubber goods dept., Goodyear T. & R. Co., Akron, O. *Member:* Amer. Legion, F. & A. M. *Address:* Goodyear T. & R. Co., Akron, O.

Rubber Industry in America

OHIO

W. J. Latimore

V. L. Smithers, Inc., engineers, 811 United Building, Akron, O., has engaged the services of W. J. Latimore, as microscopist. He is well versed in the microscopy of carbon black and will conduct research of that material in compounding and reenforcing rubber. The results of his studies will be published with physical tests and photomicrographs for the information of rubber compounders and to give the rubber trade some indication of the facilities and results obtainable through the study of compounding in the hands of an organization of consulting experts.

Republic Rubber Corp., Youngstown, a subsidiary of Lee Tire & Rubber Corp., Conshohocken, Pa., recently received orders for belting and vacuum hose aggregating close to $100,000. The company has unfilled orders totaling nearly $250,000 and is enjoying satisfactory business in mechanical rubber goods.

Twenty-five dealers representing all local tire factories recently attended a meeting in Akron and adopted a code of ethics embraced in 8 commandments and planned the formation of a tire dealers' association through which it is hoped to stabilize this branch of the rubber industry. The meeting was called by Attorney Harold M. Wilson, who has tentatively been retained as secretary-manager of the new association. The platform of 8 stipulations was drafted by the N. T. D. A. and expresses the manufacturers' wishes in connection with the retail market. The new association will hold its future meetings the first Monday of each month.

Goodrich Notes

The B. F. Goodrich Co., Akron, at a meeting of the board of directors held on June 9, 1931, appointed C. S. McCain a member of the executive committee. At the same time a dividend of $1.75 on the preferred stock was declared payable July 1, 1931, to stockholders of record June 19, 1931.

The International B. F. Goodrich Corp., export subsidiary of the Goodrich company, moved its executive offices on June 25 from 342 Madison Ave., New York, N. Y., to Akron. This move will make possible coordinated effort between the export organization and the parent company and will bring the sales executives into closer contact with the manufacturing, development, and experimental departments in Akron. S. W. Caywood is executive vice president of the corporation; J. D. Tew, president; and D. M. Goodrich, chairman of the board. V. I. Montenyohl, treasurer of The B. F. Goodrich Co., succeeded P. R. Mahony as executive vice president of the International B. F. Goodrich Corp., after the latter tendered his resignation, effective June 15. Mr. Montenyohl will continue also as Goodrich treasurer. The following are also included among the list of International Goodrich executives: H. O. Eckert, general supervisor and tire sales manager; C. A. Drach, general products sales; N. F. Weber, mechanical goods sales manager; M. T. Shaffer, credit manager; and E. D. Nathan, advertising manager.

Goodrich Silvertown, Inc., retail division of the Goodrich company, announced through its general manager, J. P. Woodlock, that it has completed and opened four new modern service stations in Altoona, Pa.; Atlanta, Ga.; and Gary and South Bend, both in Ind., since May 1. He also stated that new stores in Albany, N. Y., Bridgeport and Hartford, both in Conn., would be opened during the next few weeks.

Goodrich truck and bus tire salesmen from all parts of the United States held a conference in Akron, June 22-26, and with Goodrich executives discussed products, sales, costs, and advertising.

The Pharis Tire & Rubber Co., Newark, through Assistant Sales Manager W. A. Patterson, announced that its factory is now operating six days a week with three shifts on eight hours daily. Indications are that the increased production will continue until the Fall.

F. J. Andre, president of the Telling-Belle Vernon Co., Cleveland, has been elected a director of the India Tire & Rubber Co., Akron, to fill the vacancy caused by the death of A. T. Kingsbury, who had served in that capacity since the company was organized in 1916.

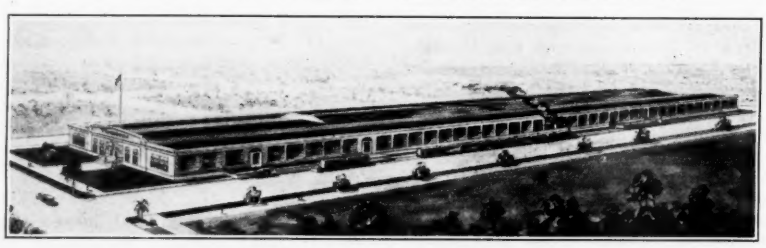
The Inland Mfg. Co., Dayton, manufacturer of automobile accessories, has added a new rubber specialty to its products, an ice tray known as the Quickube tray, the Du-flex tray, and the Flexatray, made of the pale selected crepe stock, the average tray weighing close to one half a pound. These trays are used in mechanical refrigerators to permit easy and instantaneous release of the ice cubes. During April more than 100,000 were manufactured and sold, and indications are that more than a million will be sold this year.

Anderson Rubber Co., manufacturer of rubber novelties, on June 16 moved from 124 No. Union St. to its new building at 644 E. Tallmadge Ave., Akron. With the latest equipment and improved methods, the company is prepared to give the best in merchandise and service.

E. G. Holt, chief of the Rubber Division, Department of Commerce, Washington, D. C., addressed the Akron Export Club, Akron, at luncheon on June 24. His subject was "Current Problems and Situation of the Rubber Industry."

The Firestone Tire & Rubber Co.'s new factory located at Llavallol, near Buenos Aires, S. A., which began operations April 30, has a daily capacity of 1,000 tires and tubes.

Firestone Tire & Rubber Export Co.'s vice president and general manager, Samuel Broers, accompanied by his wife and their son, sailed last month on the liner *Rotterdam* for a tour of Europe. They will make their headquarters in the Netherlands this summer.



The Firestone Tire & Rubber Co.'s Plant near Buenos Aires, S. A.

The Goodyear Tire & Rubber Co., Akron, according to an announcement by C. B. Cooper, manager, Tire Department, recently added to its heavy duty Pathfinder tires six new sizes: namely, 4.75-19, 4.50-21, 5.00-20, 5.00-19, 5.25-18, and 5.50-19. W. A. Hazlett, Goodyear eastern division sales manager, was given his twenty-five-year service pin and Vice President C. A. Stillman his ten-year service pin last month. Mr. Hazlett, who has held his present position for the past thirteen years, started with the company as a stenographer in 1906 after his graduation from Mount Union College. Mr. Stillman joined Goodyear in May, 1921, during the reorganization period, as secretary and assistant treasurer. He became vice president in 1924.

George T. Bishop, president of Continental Shares, Inc., was elected to the Goodyear board last month. He replaces W. R. Burwell, whom he also succeeded as president of Continental.

Paul W. Litchfield, Goodyear president, reports that renewal sales of tires for the past three months have been running 10 to 15 per cent ahead of last year. Original equipment sales, however, have shown a decline in line with automobile manufacturing.

"Company's general forecast," Mr. Litchfield said, "is that renewal sales will continue in good volume with results for the year showing an increase over 1930 which will be offset partially by a decline in original equipment business."

New Incorporations

E. T. Clark Rubber Co., Apr. 15 (O.), $10,000 common capital stock at $100 per share. E. T. Clark, 852 Bloomfield Ave., B. A. Dames, 438 Crosby St., and R. D. Cady, 328 Howe St., all of Akron, O. Manufacture rubber sheeting and distribute hospital and druggists' sundries.

Crown Rubber Sundries, Inc., June 15 (Del.), capital stock 1,000 shares no par value. C. S. Peabbles, L. E. Gray, and H. H. Snow, all of Wilmington, Del. Manufacture, produce, buy, sell, and generally deal in rubber goods of every class and description, etc.

Miller Sponge Corp., (N. Y.), capital 500 shares, no par value. J. M. Liebman, M. Smilowitz, and B. Abraham, all of 25 W. 43rd St., New York, N. Y. Rubber sponge, etc.

Rubber Products Corp., June 9, (Del.), capital stock 1,000 shares, no par value. M. S. Cook, A. L. McGinnis, and J. M. Townsend, all of Dover, Del. Manufacture and deal in traffic markers, guides, signals, equipment, etc.

NEW ENGLAND

Robert C. Kelley, purchasing agent of the Converse Rubber Co., Malden, Mass., is recuperating at his home from an appendicitis operation which he underwent at the Newton Hospital on May 21.

Harry C. Patrick, superintendent of the calender department at Hood Rubber Co., Watertown, Mass., is seriously ill with pneumonia at his home in Belmont.

National India Rubber Co., Bristol, R. I., branch of the United States Rubber Co., closed its Keds division on June 27 for an indefinite period, according to Factory Manager Maurice C. Smith, Jr. Approximately 1,500 persons were affected by the decision to close the shoe division of the Bristol plant and transfer its operations to Naugatuck, Conn., and Williamsport, Pa., in accordance with the United States Rubber Co.'s policy of consolidating its manufacturing operations in fewer plants. The manufacture of rubber-insulated wire will continue at Bristol with about 200 employes.

The Rubberhide Co., Randolph, Mass., specialist in footwear with a leather top and rubber sole, has sold its plant to the Goodall Rubber Co., Trenton, N. J. The machinery is being shipped to that place where the shoe will be made. The Rubberhide Co. was formed twenty-eight years ago by the late Charles Doughty, and a few years ago it was sold to the George Frost Co., Boston. Alonzo Madden, in charge of the factory, will go with the new firm to Trenton.

Russell Mfg. Co., Middletown, Conn., manufacturer of Rusco brake linings and more than 400 other automotive fabric products, last month held its annual spring conference of Division Managers. The managers who attended were: I. J. Phillips, New England Division; H. D. Felt, New York Division; G. N. Shoop, Atlanta, Southeastern Division; C. H. Nugent, Dallas, Southwestern Division; Frank Fuhrman, Detroit Division; S. J. Black, Western Division; and H. L. Wallbrecht, Dallas, assistant to Mr. Nugent. It was announced that April and May business of the company had exceeded that for the preceding three months by a very wide margin and all managers expressed the belief that the year will be a very satisfactory one in Rusco sales.

Morris M. Danovitch has been made chief chemist of the Plymouth Rubber Co., Inc., Canton, Mass., laboratory. He is a graduate of Tufts College, '23, and has been with Plymouth since that time.

The Boston Woven Hose & Rubber Co., Cambridge, Mass., was recently awarded a contract to furnish the Boston fire department with 23,500 feet of hose for $16,195.

Ernest I. Kilcup, treasurer of the Davol Rubber Co., Providence, R.I., on June 22 addressed the National Credit Men's Association at the convention in Boston, Mass., on the cooperative interchange of credit information between firms and the cooperation of creditors in dealing with insolvencies.

The Armstrong Cork Co., Boston, Mass., on June 15 consolidated all branch sales offices in one office at 286 Congress St. Previously four separate offices and warehouses had been maintained throughout greater Boston.

Herbert E. Stone, for years with the Para Rubber Co., Framingham, Mass., died last month after a long illness.

Charles Belknap, vice president of the Merrimac Chemical Co., Boston, Mass., has been elected executive vice president of the Monsanto Chemical Works, St. Louis, Mo. While his duties will remain the same with the Merrimac company, he will also act for the Monsanto president in the latter's absence. William M. Rand, also a Merrimac vice president, has been appointed a Monsanto director, succeeding Philip Stockton.

Whitworth's Rubber & Sporting Goods recently opened a store at 581 Essex St., Lawrence, Mass., to deal in rubber and sporting goods. Harold L. Whitworth, who has been in this field for the past ten years, is the owner.

Charles H. Cornell, comptroller of the E. H. Clapp Rubber Co., Boston, Mass., was honored last month with a dinner by the Boston Chapter of the National Association of Cost Accountants at the Hotel Statler. The banquet marked the close of the most successful year in the history of the association, under the guidance of Mr. Cornell as president. He has served on the board of directors for three years, as vice president in 1929 and 1930 and president in 1931.

The Dewey & Almy Chemical Co., Cambridge, Mass., recently formed a subsidiary, Dewey & Almy, Ltd., to handle the distribution of its products in England and on the Continent. Among the products are latex cement for the shoe industry, multibestos latex brake lining, and Darex, the latex felt insulated lining material.

E. R. Lawler has resigned as general chairman of the Rubber Section of the National Safety Council because the Woonsocket Rubber Co., Woonsocket, R. I., with which he had been associated, is now closed. C. L. Hungerford, of The Firestone Tire & Rubber Co., formerly vice chairman, succeeds Mr. Lawler.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Dominion Rubber Co., Ltd.	Pfd.	$1.75 q.	June 30	June 20
Firestone Tire & Rubber Co.	Com.	$0.25 q.	July 20	July 3
General Tire & Rubber Co. 6%	Pfd.	$1.50 q.	June 30	June 20
B. F. Goodrich Co.	Pfd.	$1.75 q.	July 1	June 19
Goodyear Tire & Rubber Co.	Com.	$0.75 q.	Aug. 1	July 3
Goodyear Tire & Rubber of Cal.	Pfd.	$1.75 q.	July 1	June 20
Goodyear Tire & Rubber of Can.	Com.	$1.25 q.	July 2	June 15
Goodyear Tire & Rubber of Can.	Pfd.	$1.75 q.	July 2	June 15
Stedman Rubber Flooring Co.	Pfd.	$1.75 q.	July 1	June 26

PURE GUM TUBING HAS BEEN KEPT FRESH for ten years in water containing 3 per cent of carbolic acid.

—NEW JERSEY—

Early summer finds rubber production normal in New Jersey plants. Hard rubber factories report decreased demand; while gains are announced in rubber cloth, tiling, brake lining, belting, and hose. Some plants are still busy on jar rings for the summer trade. Wholesalers have increased orders for summer footwear, heels, and soles, but tire production remains stationary.

Kelso Mfg. Co., Trenton, organized fifteen years ago to make brake lining, has a receiver, George A. Rickard, appointed by Judge John B. Avis, of the United States District Court. George P. Frost, an official of the company, claims he loaned the concern $26,500.

Bernard E. Sweeney, formerly president of the Sweeney Tire Service, Inc., Trenton, has obtained an interest in Volk's, Inc., Trenton distributers of the General Tire & Rubber Co., Akron, O. Volk's, Inc., now consists of Daniel H. Volk, Fred C. Gladstone, and Mr. Sweeney as sales manager. He has disposed of the Sweeney Tire Service.

C. Edward Murray, Jr., Princeton, former president of the Murray Rubber Co., Trenton, has been elected president of the Trenton Society for the Prevention of Cruelty to Animals.

Joseph Stokes Rubber Co., Trenton, reports good business with increased orders for hard rubber products. The plant at Welland, Canada, is normal.

American Hard Rubber Co., Butler, will build a $40,000 brick and steel addition to its factory.

Rubber Manufacturers' Association of New Jersey held its annual summer outing on June 9 at the Trenton Country Club. Following dinner, members and guests played golf. There was a large turnout, and A. L. Viles, of the Rubber Manufacturers Association, Inc., New York, N. Y., was one of the guests.

Pierce-Roberts Rubber Co., Trenton, N. J., reports continued normal business. Despite the depression the number of employes is the same.

Murray Rubber Co., Trenton, announced that May business showed a substantial increase over April. The concern is operating normally. William R. Dalton, Murray superintendent and purchasing agent, is spending some time with his family at Bay Head.

Essex Rubber Co., Trenton, in filling orders for summer goods, is operating normally. The company expects continued good business for the summer.

Lambertville Rubber Co., Lambertville, because business is slackening up in rubber footwear, at present is not functioning to capacity.

Thermoid Company, Trenton, finds continued good business in all departments, with increased automotive equipment production.

Pocono Rubber Cloth Co., Trenton, is having a busy season with orders increasing for its product for the automotive industry.

Puritan Rubber Co., Trenton, reports May business the largest for a single month in the history of the concern, which will be busy during the summer.

—MIDWEST—

A. S. T. M. Meeting

The thirty-fourth annual meeting of the American Society for Testing Materials was held at The Stevens, Chicago, Ill., June 22-26, 1931. An extensive program of committee reports and papers was read. The symposium on Abrasion Testing of Rubber comprised five papers by well-known technologists and elicited much interest and discussion.

An exhibit of apparatus and appliances for process control and physical testing of materials and products was of much engineering interest.

Among the concerns whose exhibits were of special interest to rubber goods manufacturers were the following: Baldwin-Southwark Corp., Philadelphia, Pa.; Bosch & Lomb Optical Co., Rochester, N. Y.; Christian Becker, Inc., New York, N. Y.; The Brown Instrument Co., Philadelphia, Pa.; E. Leitz, Inc., New York, N. Y.; The Moorehouse Machine Co., York, Pa.; Precision Scientific Co., Chicago, Ill.; E. H. Sargent & Co., Chicago, Ill.; H. Z. Schniewind, New York, N. Y.; The Shore Instrument & Mfg. Co., Jamaica, N. Y.; Alfred Suter, New York.

The Production Meter Service Corp., 1315-1325 So. Wabash Ave., Chicago, Ill., on May 18 was placed in receivership of the Chicago Title & Trust Co.

Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind., through E. J. W. Fink, president, announced the termination of the strike after coming to a satisfactory settlement of the wage difficulties that caused 2,800 employes to strike. All the employes have returned to work.

F. F. Sommers, Jr., was elected treasurer and general manager of the Chicago Rubber Clothing Co., Racine, Wis., at a meeting of the directors of the company. He succeeds J. F. Johnson.

United States Rubber Co., Detroit, Mich., now equips heavy duty tubes with the interchangeable Eger type valve, greatly reducing the inventory necessary for a dealer to meet all demands. The tube comes equipped with a spud and is accompanied by whatever standard valve the dealer may specify. If the valve type found on the tube is not the type wanted by a purchaser, it is an easy matter to remove one of the type desired from another tube and substitute it. Or the dealer may carry a variety of valve styles. This convenience means that the dealer may carry only a reasonable stock of tube sizes, with a separate stock of interchangeable stems.

I. Ely Reed, secretary of the Mercer Rubber Co., Hamilton Square, upon returning from a recent three-week business trip through the West and the Northwest, declared business is increasing in the towns he visited.

Whitehead Bros. Rubber Co., Trenton, still operates five days a week, and expects to continue on that basis during the summer. The company claims that orders for all mechanical goods are firm.

Foreign Trade Circulars

Special circulars containing foreign rubber trade information are now being published by the Rubber Division, Bureau of Foreign and Domestic Commerce, Washington, D. C.

Number	Special Circulars
3004	Comparative exports of boots and shoes from the United States, Canada, United Kingdom, and France, first quarter, 1931.
3005	Comparative tire exports from the United States, Canada, United Kingdom, and France, first quarter, 1931.
3008	German tire exports, first quarter, 1931.
3009	Belgian tire exports, February, 1931.
3010	Market for tennis shoes in Rome consular district.
3012	Crude rubber reexports for April, 1931.
3014	Sixth report on native rubber cultivation.
3017	Market for soles and heels in southern Sweden.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	Inquiry
1365	Manufacturer of rubber pad for cowl of an automobile.
1366	Manufacturer of the Wrap-A-Tire tire wrapping machine.
1367	Manufacturer of printers' and offset printers' blankets.
1368	Manufacturer of latex collecting cups, which must be of glazed earthenware or neutral to acid.
1369	Manufacturer of hose wrapping machines.
1370	Information regarding cost of a rubber factory producing four to five hundred rubber soles per day.
1371	Manufacturer of machinery for making tire boots and patches.
1372	Manufacturer of rubber seed oil for paints.
1373	Manufacturer of elastic webbing.
1374	Manufacturer of molded rubber strap 5 inches long, ¾-inch wide.
1375	Manufacturer of metal parts for the rubber trade.
1376	Manufacturer of white rubber sponges.
1377	Manufacturer of "hoodwink," all rubber molded goggles with rubber instead of glass lenses, for initiations.
1378	Manufacturer of rubber thread.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

Number	Commodity	City and Country
*51,754	Toys	San Jose, Costa Rica
†51,772	Tape	Maceio, Brazil
†51,824	Belting	Heilbronn, Germany
†51,843	Balls, motorcycle and bicycle tires and grips	Bombay, India
‡51,870	Sport goods	Erbach i. Odenwald, Germany
*†51,878	Bathing caps	Prague, Czechoslovakia
†51,883	Pharmaceutical, dental, and medical goods	Paris, France
*51,887	Bathing caps, balls, sponges, heels, and balloons	Rio de Janeiro, Brazil
†51,954	Balls and sponges	Copenhagen, Denmark
†51,955	Fountain syringes, nipples, gloves, and other druggists' goods	Barcelona, Spain
†51,958	Bicycle tires	Roudnice nad Labem, Czechoslovakia
†51,994	Druggists' sundries	Ponce, Porto Rico
†52,046	Footwear and specialties	Brussels, Belgium
*52,094	Scrap rubber	Kobe, Japan
‡52,095	Raincoat rubberized fabric	Manchester, England
*52,108	Rubber goods	Milan, Italy
†52,162	Tires	Vienna, Austria
†52,187	Footwear	Vienna, Austria
†52,200	Boots	Saint Ouen, France

*Purchase. †Agency. *†Purchase and agency. ‡Either.

EASTERN AND SOUTHERN

Rand Rubber Co., Halsey St. and Sumner Ave., Brooklyn, N. Y., plans a factory addition and alterations at an estimated cost of $40,000, including equipment.

Tire and Auto Accessory Topics, a trade journal for tire dealers, has been sold by the McAleenan Publishing Corp. to Federated Business Publications, Inc., 420 Lexington Ave., New York, N. Y., who will merge *Tire Topics* with *Tires,* the oldest dealer publication in the field.

The Rubber Manufacturers Association, Inc., New York, N. Y., has filed an application with the Tariff Commission for an increase in the duty on canvas, rubber-soled footwear and waterproof footwear.

National Better Business Bureau announced that many tire manufacturers and distributers have agreed to a set of definitions to be used in advertising and selling. The standards adopted serve to define such terms as a "ply," a "breaker strip," a "first line" tire, a "second line" tire, a "third line" tire, a "heavy duty" tire, a "super heavy duty" tire, and the "bead" of a tire.

J. S. Tritle was elected vice president and general manager in charge of manufacturing, sales, and engineering operations of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., at a recent meeting of the board of directors. He will report to President F. A. Merrick. Mr. Tritle has been with Westinghouse since 1915. M. B. Lambert, assistant to the vice president, has been appointed general advertising manager for Westinghouse, succeeding J. C. McQuiston, resigned.

D. J. Quammen has been appointed manager of the Philadelphia district office of Cutler-Hammer, Inc., Milwaukee, Wis., manufacturer of electric motor control and allied apparatus. He has been with the Philadelphia office of the company for the past five years as sales engineer and succeeds F. J. Burd, who has been made assistant manager of the Cutler-Hammer Chicago office. Mr. Burd will have charge of industrial sales in the Chicago district, and of the C-H (Harland) paper machine drive throughout the country.

McClaren Rubber Co., Charlotte, N. C., manufacturer of McClaren Autocrat tires, through General Manager I. Eisbrouch, announces that tire production at its factory has gained 40 per cent over that for May, and plans are made further to increase this production so that the plant will be operating at capacity by July 1.

Pennsylvania Rubber Co., Jeannette, Pa., last month celebrated its thirty-second anniversary as the manufacturer of Pennsylvania tires and tubes by working at top speed. Pennsylvania's business has increased remarkably this Spring because of the creation of merchandising plans which have proved unusually successful for dealers. Demand has become so strong that recently the plant went on a seven-day-week production schedule.

S. A. E. Meeting

Seven hundred automotive engineers convened during the week of June 15-20 at The Greenbrier Hotel, White Sulphur Springs, W. Va., in an attempt to solve new design and manufacturing problems of the automobile industry. Occupying a full week, with fourteen technical sessions and numerous committee meetings, the Society of Automotive Engineers discussed automobiles, aircraft, motor trucks and coaches, the evolution of the Diesel and other automotive engines, Diesel fuels, transportation by motor coach, freight-carrying by motor trucks, the investigation of detonation, developments in gasoline and lubricants, the elimination of "vaporlock," and the results of Bureau of Standards research work.

Dorr-Oliver Corp. is a result of the union, as of June 1, of the business and assets of The Dorr Co., 247 Park Ave., and Oliver United Filters, Inc., 33 W. 42nd St., both of New York, N. Y., and will be operated under the joint management of John Van Nostrand Dorr and Edwin Letts Oliver. Dorr-Oliver Corp. will function through its two wholly-owned operating units, a new Dorr Co., Inc., and a new Oliver United Filters, Inc.

Hodgman Rubber Co., Framingham, Mass., has moved its New York, N. Y., office to 261 Fifth Ave. where is displayed a complete line of the company's products including rubberized fabrics, sheetings, rubber bands, molded finger tips, extruded products, and sporting specialties.

Vulcanized Rubber Co., Morrisville, Pa., is not operating to capacity at the present time, for orders for hard rubber products began to drop off a few weeks ago. The company recently suffered loss by flames which swept a part of the storehouse, which contained a quantity of carbon bisulphide besides other goods.

Mitsui & Co., Ltd., moved its offices on June 8 from 65 Broadway and 180 Madison Ave. to new quarters in the Empire State Building, 350 Fifth Ave., New York, N. Y. Telephone Chickering 4-2900.

The St. Joseph Lead Co., 250 Park Ave., New York, N. Y., has established warehouse stocks of St. Joe zinc oxides in Trenton, N. J., Boston, Mass., and Los Angeles, Calif., for the convenience of the local consuming industries. The following have been appointed local sales distributers: H. M. Royal, Inc., Oakland & Norman Aves., Trenton, N. J.; William D. Egleston Co., 133 Pearl St., Boston, Mass.; and C. P. Hall Co. of Calif., 1340 E. 6th St., Los Angeles, Calif. In addition to those listed the company also maintains its own zinc oxide district sales office in Pittsburgh, Pa., in charge of R. L. Cathcart.

Cities Service Co's., 60 Wall St., New York, N. Y., marketing subsidiaries will handle tires and other automotive equipment in their service stations, which plan Frank LeRoy Blanchard, director of advertising and news of Henry L. Doherty & Co., fiscal agent for Cities Service, believes will be very profitable.

A. Schrader's Son, Inc., plant in Brooklyn, N. Y., was recently visited by Frank Crilley, chief diver of the submarine *Nautilus,* who inspected the diving equipment of the company.

"As a diver descends," he said, "the pressure of the water increases about a half-ton every foot. This pressure from above has to be equalized by constantly increasing the air pressure within the suit. If this is not done the diver is crushed to death. Needless to say, the valves used to keep up the pressure have to work perfectly."

Motorists may be surprised to know that the tire-valve is a development of the air-valves used in diving suits. When pneumatic tires were invented, the principle of the valve used in Schrader diving apparatus was employed to maintain air pressure in them.

LeRoy C. Pierson, formerly general manager of the Kelly-Springfield Tire Co.'s branch at Albany, has been transferred to the concern's new distribution headquarters at Syracuse, both in N. Y., where he will have charge of all sales throughout the state, with the exception of metropolitan New York. The Kelly-Springfield units at Albany and Buffalo will henceforth be maintained only as warehouses.

Finished Heel Stock Rooms—Endicott Johnson Corp., Johnson City, N. Y.

PACIFIC COAST

While business for the rubber trade on the Pacific Coast has been quite spotty during the past month, sentiment continues to be very optimistic. To many of the best judges of the state of trade, recent developments plainly indicate that the upward trend is undoubtedly well underway, but it may be several weeks before marked advantages are realized. One encouraging feature is a noticeable easing up in collections; another is the increase in total number and in money value of building permits in nearly all sections. The depression in one of the greatest industries, oil production and refining, is still felt acutely by numerous rubber manufacturers and dealers who have been providing staples and specialties, but hope is entertained by leading oil company executives that an agreement will be reached in a few weeks whereby the gasoline price war will be ended and more latitude will be allowed in drilling and like operations.

Plans by the major tire making companies for the further expansion of their direct sales stations is taken as good evidence of the efficiency of the factory "chains" in affording economical distribution, a matter hitherto much debated. Some of the companies declare that their policy in this respect is now definitely settled, and that while the general dealer will always be generously encouraged, the companies will increasingly aim to control the selling as closely as they do the manufacturing of their products and not only increase the number of stations but steadily enlarge the scope of their usefulness to motorists. Certain it is that the companies have been getting the pick of help for the stations. Many hitherto successful tire distributers have been only too willing to ally themselves with the chain service, finding that they have been able thus through salary and commission to earn as much, if not more, money than in business for themselves without investment, risk, high overhead, etc.

Firestone Tire & Rubber Co. of California has been sharing the general good fortune of the Firestone plants in this country and abroad, and the plant in Los Angeles continues to be one of the most active on this coast. According to Vice President and General Manager R. J. Cope the factory is running well above the capacity recorded for July, 1930, and the employment of 1,600 on three shifts daily for five days a week makes a much better showing than a year ago. Daily output of tires is close to 9,000, and the prospects are that this will be maintained, if not bettered, for the remainder of the summer. Mid-June visitors at the plant were Vice President Russell A. Firestone, son of Harvey S. Firestone, Sr., and M. E. Ake, in charge of production, both of Akron, O.

Cascade Rubber Co., manufacturer of rubber-covered paper mill rolls, 35 W. Lander St., Seattle, Wash., according to Secretary H. P. Pratt, finds the general outlook for business in the paper and pulp trade quite encouraging. While the company does much recovering of rolls, it is not doing any grinding as heretofore; the mills prefer to do this work themselves. S. P. Barash is president.

United Rubber Corp., maker of hard rubber products, largely battery containers, and camelback, 37 Arkansas St., San Francisco, Calif., according to President Herbert King, is very busy, being 100 per cent ahead in production above that of last year, and 200 per cent over that of 1929. The company plans considerably to increase its equipment to take care of the growing business. The financial position of the company has been much enhanced of late by the acquisition of a large volume of stock from former owners by the Stauffer Chemical Co., which has extensive interests in this country and abroad. The other officers, besides Mr. King, are Walton R. Smith, vice president in charge of sales; Everett Griffin, of the Stauffer Co., secretary-treasurer. These comprise the board of directors with John Stauffer, Sr., of the Stauffer Co., a resident of San Francisco.

Facific Goodrich Rubber Co., Los Angeles, Calif., recently added an extra day to its weekly working schedule, and the plant now operates six days a week in most of its departments, some on two and others on a three-shift basis. About 500 are employed, and the daily outturn is averaging 3,500 tires and 3,700 tubes. Superintendent Fred A. Nied and General Sales Manager Frank E. Titus recently returned from a conference with executives of the parent Goodrich company in Akron, O. Merchandising and Advertising Manager R. E. Jaffers is visiting the chief distribution centers in the entire coast area.

H. W. Sharp Co., 209 Oak St., Portland, Ore., dealer in rubber belting and mill supplies, according to President Sharp, reports that, while business has been quiet, the resumption of work by large sawmills in the Northwest gives reason to believe that there will be an early improvement in belting sales. The company is the exclusive representative of the Republic Rubber Co., which also maintains agencies at Spokane, Seattle, Tacoma, San Francisco, Los Angeles.

Goodyear Tire & Rubber Co., Los Angeles, Calif., produces about 8,500 tires and 7,500 tubes daily, with the plant operating at about 80 per cent of capacity, as compared with about 6,000 tires daily in the latter half of 1930, according to Vice President and General Superintendent Leroy Tomkinson. Three shifts are worked daily for six days a week. About 2,150 are employed. A recent visitor was J. H. Murphy, of Manila, Philippine Islands, representing the Houston Rubber Co., Manila, a Goodyear subsidiary and chief distributer of Goodyear products in the islands. A notable feat was recently performed with the Goodyear blimp "Volunteer," which flew out to sea and picked up two large bags of mail matter from the "*City of Los Angeles*," coming from Honolulu and deposited the mail on the roof of the postoffice at the harbor of San Pedro several hours before the arrival of the liner. It was the first time that any packages had been picked up thus by an airship on the Pacific Coast.

Fisk Tire Co., through G. Al Wood, Pacific Coast manager, recently arranged with J. P. Schiller, president of Schiller Tires, Inc., for a $1,000,000 franchise for the exclusive sale of Fisk tires in Los Angeles and Hollywood. Mr. Schiller had been St. Louis district manager for the United States Rubber Co., and is vice president of Nelson & Price, local Dayton tire distributers.

United States Rubber Co., Samson Corp. Division, Los Angeles, Calif., has within the past two months increased production about 30 per cent and nearly doubled the number of employes. All the new machinery supplied by the company in Detroit has finally been installed and now the chief anxiety of those in charge of the shop is the breaking in of unskilled labor while trying to overtake the steadily accumulating orders. While the daily output is about 5,500 tires, it is expected that in July this will be brought up to 7,000 a day. About 1,200 are on the pay roll. Unit and dollar sales are much ahead of the middle of 1930. The new latex-fabric treating equipment is said to be working very satisfactorily. General Sales Manager J. B. Magee has been in conference with the company executives at Detroit.

General Rubber & Supply Co., 41-43 First St., Portland, Ore., according to Manager Jas. P. Carney, finds business taking a turn for the better and looks for a steady improvement. The company has the exclusive agency for the Diamond Rubber Co., carrying a complete line of belting, packing, hose, and various mechanical rubber goods.

Pacific Rubber Shoe Co., 163 Jackson St., Seattle, Wash., according to R. F. Miller, treasurer and general manager, regards the business outlook for the remainder of the year as quite encouraging, and that only very unseasonable weather can prevent a lively revival. The chief product handled is the Firestone brands of rubber footwear. The other officers are: president, F. A. Larsen; vice president, W. H. Trockstad; and secretary, P. N. Melby.

Cactus Mfg. Co., which had long been engaged in making studded tire boots, patches, and auto accessories, is now doing a large business in making and distributing link-constructed floor matting, die-cut from pulled tire fabric and in two tones. Not only is the Pacific Coast field well covered, but considerable business is being developed in the Midwest, according to President C. J. Evans, who founded the concern in 1922. Other officers include: vice president, C. W. Hartranft; and secretary, Henry M. Lee. The factory is located at 2700 San Fernando Rd., Los Angeles, Calif.

V. G. Thomas, well known in the rubber chemical trade on the Pacific Coast, has returned to his old associates, L. H. Butcher Co., Los Angeles, and is now at 2030-2034 Bay St.

CANADA

Gardens and lawns are now receiving considerable attention, and lawn hose is selling in fairly large quantities. Rubber manufacturers in quoting prices on mechanical rubber goods, garden hose, etc., have decided to absorb the increased percentage of sales tax; so prices are quoted to the trade without change from those in effect before the Budget speech, with tax included. The manufacturers' first decision, now reversed was to deduct 1 per cent and add 4 per cent to take care of the increase in the sales tax.

Automobile parts included in the Budget announcement are: rubber tires, wheels, hubs, drums, tire covers, brakes, windshields, upholstering fabrics, etc. These articles are made in Canada. In goods not made in Canada the drawback is to be reduced from 99 to 60 per cent. This decrease may effect reduced prices for Canadian-bought tires.

An official of one of the Toronto rubber companies intimated that he very shortly expected adjustments in automobile tire prices, and new lists to be issued. He would not state definitely how prices would move but indicated that the sales tax change would be considered.

In an advertisement in a Toronto newspaper a company selling automobile tires to motorists claims a "Declared Tire War" and lists a number of special quotations on tires. The advertisement states "guaranteed cord tires of well-known standard makes, sold with a guarantee that is a guarantee." Some of the tire prices include: 30 by 3½, $1.95; 29 by 4.40, $2.75; 30 by 5.25, $3.50; 31 by 5.25, $3.50; 33 by 6, $4; 30 by 5, $4.

Canadian Goodrich Co., Ltd., Kitchener, Ont. The National Poster Contest for boys and girls originated by R. C. Groffman, Goodrich advertising and sales promotion manager, is a constructive merchandising effort to help build goodwill and attract customers for dealers. Children five to fifteen are offered a poster packet free with every purchase of $1 or more, or they can buy a package for 10 cents. Each includes a cardboard on which to make the poster, eight sheets of colored paper, one sheet of carbon paper, and one large sheet of poster patterns. The firm stands part cost of prizes and shares in a portion of newspaper expense. The company benefits in that the name "Goodrich" must appear on every poster and also that certain of its sport shoes are illustrated on the instruction sheet.

Northern Rubber Co., Ltd., Guelph, Ont., recently issued an illustrated, multi-colored broadside of its summer footwear. A price list is enclosed.

The Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., through H. J. Clark, in charge of its sporting goods sales, is introducing to the trade Canadian products manufactured by the company in England, including a complete array of tennis goods. Dunlop proposes marketing these goods through Provincial distributers, with representation in all provinces of the Dominion.

Blank & Stoller, Inc.

Wm. H. Miner

The Canadian Manufacturers' Association at its recent Dominion Wide Annual Convention at Victoria, B. C., unanimously elected as president, W. H. Miner, president of the Miner Rubber Co., Ltd., Granby, P. Q. He has for some years been active in the association, serving also as chairman of the Montreal Branch and a member of the Dominion Executive Council. He has been in the rubber trade for over 30 years.

The National Association of Purchasing Agents, at its annual convention, Toronto, Ont., June 8 to 11, was of particular interest to rubber men, as many rubber company buyers attended and were on the program. Owing to the illness of Robert C. Kelley, purchasing agent of the Converse Rubber Co., Malden, Harrison K. Royce, purchasing agent of the Boston Woven Hose & Rubber Co., Cambridge, both in Massachusetts, U. S. A., presided at the textile session, and introduced Robert Bowe, vice president of the Hunter Mfg. & Commission Co., who spoke on "What Is the Matter with the Cotton Buyer?" Frank Seiberling, president of the Seiberling Rubber Co., Akron, O., U. S. A., addressed the main session of the convention on "Rubber and the Rubber Industry." C. F. Marshall, Seiberling purchasing agent, presided over the educational conference.

Prof. F. F. Lloyd, director of the Biological Building and recently elected vice president of the Royal Society of Canada, will be one of two official delegates to represent both McGill University, Montreal, P. Q., and the Royal Society of Canada, at the centenary meeting of the British Association for the Advancement of Science, to be held in London, England, Sept. 23 to 30.

Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., has granted its franchise for the city of Montreal to the United Tire Stores, who announced this acquisition in full-page advertisements in all local dailies, both French and English.

Gates Rubber Co. of Canada, Ltd., has been formed by the Gates Rubber Co., Denver, Colo., U. S. A., under the direction of Arthur Brittain, of Arthur Brittain Sales Co., Ltd., Montreal, P. Q., Canadian representative for Gates fan belts and radiator hose for many years. A complete stock to service all makes of cars and trucks is carried in Montreal.

L. Jerome Floum, partner in the financial firm of K. D. Johnson & Co., Wall St., New York, N. Y., U. S. A., according to current reports, is interested in establishing a carbon black plant near Edmonton, Alta. Mr. Floum, now in Alberta for New York interests, plans to confer with the authorities regarding the proposition. The huge waste of gas at Turner Valley offers an opportunity to establish a carbon plant.

Continental Carbon of Canada, Ltd., Toronto, Ont., a new industry for Toronto, will manufacture radio resisters and carbon specialties. The parent company is the Continental Carbon Co., Cleveland, O., U. S. A. Manufacturing space has been leased at 89 Jarvis St., where equipment soon will be installed. S. Roy Paisley, of Toronto, is in charge.

The Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont. In a recent statement President E. W. BeSaw has shown that no other commodity has dropped so far in price in the last five years as have automobile tires, which he said cost only 45.7 per cent of what they did in 1926. Tires not only cost less, but are of higher quality and give longer mileage. Reducing tire costs down to cost per mile, Firestone statisticians found that, whereas from 1910 to 1912 the tire-mile cost was $0.0112 a mile, today it is $0.000,767; or whereas tire costs were then more than a cent a mile, the motorist now gets about 15 miles a cent.

J. A. Livingston, Firestone sales and advertising manager, now in Winnipeg, just completed a Dominion-wide trip from Halifax, N. S., to Vancouver, B. C. During this trip he called on Firestone distributers and held sales conferences at all principal distributing points.

Imperial Oil, Ltd., Toronto, Ont., reports sales of Atlas tires through Imperial oil service stations this year have exceeded original estimates. From a source altogether outside the company it is understood that total sales to date are between 15,000 and 20,000 tires.

Dominion Rubber Co., Ltd., Montreal, P. Q., has added the Bill Tilden Tennis Shoe to the popular Fleet-Foot brand of sports shoes. The Tilden shoes, packed in display boxes bearing the champion's authorized picture and name, have been designed according to specifications by Big Bill for his own use. The company has issued also an interesting booklet, "25 Secrets of Better Lawns and Gardens," featuring Dominion garden hose and other popular sellers, as well as inside information on the care and the cultivation of lawns and gardens.

Gutta Percha & Rubber, Ltd., Toronto, Ont., in daily newspapers devotes large space to its tires, emphasizing the Gum Cushion. The slogan is, "The largest all-Canadian rubber company—founded in 1883."

Goodyear Notes

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., now operates Saturday mornings, thus increasing production moderately. This step was taken because sales have been running above estimates. It is anticipated that no material decrease will be shown in demands during the remainder of the fiscal year. Production of tires approximates 5,000 a day, with output of tubes between 4,000 and 4,500 daily. Sales of rubber specialties on the whole are being maintained at about the same level as earlier in the year. Demand for belting has decreased, but sales of hose and rubber heels have improved. Goodyear, in common with other Canadian tire manufacturers, will benefit by the withdrawal of the drawback, with respect to importation of tires. Officials take the new provisions in the Bennett tariff to mean that it will pay United States manufacturers of motor cars to ship their cars without tires into Canada.

This company invited all its dealers and employes to attend Goodyear's School of Modern Tire Repairing and Service. Training is free, and each student receives personal attention, with practical, complete instruction on actual jobs, using modern, up-to-date equipment. Goodyear recently added six new sizes to its heavy duty Pathfinder tires, as well as additional sizes in Pathfinder tread truck tires. The 6.00-20 bus-truck type balloon tire now replaces the 6.00-20 truck type, and a greater trade acceptance of this line is anticipated.

A recent shipment from Goodyear's Bowmanville, Ont., plant to Vancouver, B. C., included three large conveyer belts for mining operations, etc. Recently 6,000 feet of conveyer were made and shipped at one time to South America for a mining corporation.

James R. Coe recently was appointed Goodyear district manager in British Columbia, with headquarters in Vancouver. He has been a resident of the prairie provinces for twenty years and has been manager of the Goodyear Saskatoon, Sask., branch for the past decade.

Gas Consumption per Car

Perhaps the most reliable statistics to be found relating to the use of cars are in those of the per car consumption of gasoline. The figures for 1930 have just been published by the bureau of roads and show 556.3 gallons of gas are consumed by the average car in one year, or let us say in other units that the average car will travel 7,000 miles per year.

The curious and interesting fact brought out is that this figure of 556.3 is only one-tenth of a gallon less than the figure for 1929, showing that even in times of depression people use their cars as freely as ever.

Does not this point out that cars are now being run as strenuously as before and, therefore, will wear out at the average rate, thus bringing about the usual market for replaced cars? *Automotive Abstracts.*

OBITUARY

Rubber Heel Inventor

HUMPHREY O'SULLIVAN, pioneer rubber heel manufacturer, prominent in Democratic politics, and a Knight of St. Gregory, died June 22 at his home in Lowell, Mass., where he had been confined for six months since his return from St. Elizabeth's Hospital after a serious operation.

Mr. O'Sullivan was born in Skibbereen, near Cork, Ireland, Oct. 7, 1853, and emigrated to America in 1874, coming to Lowell, where with his brother, the late James O'Sullivan, he conducted a shoe business.

After inventing the O'Sullivan rubber heel, the brothers organized the O'Sullivan Rubber Heel Co. in 1899, which prospered and became internationally prominent.

Humphrey O'Sullivan became identified with many other business and financial interests, holding positions on the directorates of several banks and firms.

He was a benefactor of St. Patrick's Church, of its various societies and organizations. His activities brought him many honors, including appointment as a Knight of St. Gregory by Pope Pius.

He held membership in many organizations, including the Celtics, Ancient Order of Hibernians, Irish Historical Society, St. Vincent de Paul Society, Catholic Order of Foresters, St. Patrick's Holy Name, the C. Y. M. L., Lowell Lodge of Elks, the Yorick Club, and the Lowell Typographical Union.

The funeral was held from his home June 25 at 9:30 a.m., followed with a solemn high requiem mass at St. Patrick's Church at 10 o'clock. Burial was in St. Patrick's Cemetery, Lowell.

A. M. Hamblet

ABEL MARTIN HAMBLET, former chief chemist for The Goodyear Tire and Rubber Co., died in New York City on June 7. He was born in 1881 and graduated from the Massachusetts Institute of Technology in 1902.

Mr. Hamblet's connection with the rubber industry dates back to 1922 when he joined the Goodyear company. From that time until a few years ago he held various positions there.

His widow and three children survive him. The burial took place June 9 in Salem, Mass.

Old Time Rubber Man

ANDREW E. NOAH, who for 18 years served The B. F. Goodrich Co., Akron, O., as a director, died on May 30. He was instrumental in bringing about the consolidation of the Goodrich company, with The Diamond Rubber Co., in 1913.

In addition to being connected with the rubber industry, Mr. Noah was associated with real estate, hotel, construction banking, and insurance institutions, and before that followed a teaching career. He was appointed general manager of The Diamond Rubber Co. in 1897, and after a short time, treasurer. When the two companies were consolidated he refused the position of treasurer and was appointed a director.

He was well known as a philanthropist, and aided many educational and charitable institutions. He was trustee of Buchtel College, now the University of Akron, and of Oberlin College from which he graduated.

Mr. Noah is survived by his widow, a son, and a grandson. The burial was in Akron, June 1.

William R. Millar

WILLIAM R. MILLAR, an employe in the shipping export advertising department of The Firestone Tire & Rubber Co., Akron, O., died June 12 at his home. He had been with the Firestone company for many years and was active in his work until six weeks before his death. A daughter and a son survive him. Burial was in Akron on June 15.

Industry and Trade

From Report of National Industrial Conference Board

Automobile output in May declined under output in April more than the normal seasonal amount. Production in May is estimated to total 325,000 units, showing a decline of 8 per cent under April and 27 per cent below May, 1930. Seasonal contraction between April and May is usually 1 per cent. During the first five months of this year 1,375,400 units were turned out as compared with 1,960,000 in the same period a year ago, a decline of 30 per cent.

Retail sales in April showed an increase of 35 per cent over March, but a decrease of 22 per cent under April, 1930. New car registrations for eleven states in May reflect a decline of 4 per cent below April and of 30 per cent below May, 1930.

Crude rubber consumed in May increased markedly more than the usual seasonal increase over April of 2 per cent. Consumption of crude rubber by manufacturers in the United States for the month of May was the highest for any month since May a year ago and is estimated to be 37,817 long tons, an increase of 13.5 per cent over the April consumption of 33,321 long tons.

Imports of crude rubber for May amounted to 31,720 long tons, the lowest figure since August, 1928, and compares with 46,648 long tons for April and 40,745 long tons for May, 1930.

For the first time since September, 1929, stocks on hand in the United States showed a decrease from the previous month's figure. Total domestic stocks of crude rubber on hand and in transit overland, May 31, are estimated at 220,799 long tons, a decrease of 3.3 per cent under April, although 56.2 per cent over May, 1930. The usual April to May decline is 1 per cent.

Crude oil production in May increased by 3 per cent over production in April. Gasoline stocks on hand at the end of May decreased by 2 per cent under what they were at the end of April, though a 6 per cent decline for the interval has been observed in recent years.

Rubber Industry in Europe

GREAT BRITAIN

R. G. A. Meeting

On May 14, 1931, the unusually well-attended annual meeting of the Rubber Growers' Association was held in London. In his speech, the retiring chairman, J. G. Hay, fully surveyed the present situation. What he said regarding coordinated selling and the proposal made in 1929 by the committee appointed to consider central selling, will surely find a strong echo today in many a producer's mind. It will be remembered that the committee recommended producers to organize themselves into larger units for the purpose of selling. But the industry, disappointed at a scheme which offered no immediate prospects of a rise in the price of rubber, turned the proposal down.

It is interesting to speculate as to what the present condition of the industry might have been if, instead of allowing individualism and restriction to dominate them, producers had carefully considered the recommendations of the committee and had made a sincere attempt to put them into effect, even though no sensational results, nor for a long time, any results, might be obtained in price regulating.

Something of this must have passed through M. Hay's mind when he said: "I make no complaint, but I am constrained to offer these observations. What the industry refused to do of its own free choice is now being brought about by the pressure of economic conditions, and producers will yet organize themselves into larger units not only for selling, but also for production—deep and far-reaching changes are taking place in the industry. This incidence of fixed charges, the cost of efficient management and administration will not continue to be met adequately under rapidly changing conditions except on a large unit basis."

Mr. Hay then went on to discuss the work of the Commercial Research Department, the purpose of which is to collect and collate all basic facts concerning the production and absorption of rubber. It was his opinion that ignorance of vital facts, for instance the growth and development of Dutch East Indies native rubber, has to a certain extent been a contributory cause of the present situation.

The Rubber Growers' Association is further considering the desirability of establishing an Intelligence Service to study and estimate the factors affecting native production both in the Dutch East Indies and Malava. Such an undertaking requires the cooperation of the Dutch and of The Rubber Manufacturers' Association, Inc., in America, since R. G. A. funds are limited.

In regard to propaganda activities, the directions in which definite progress has been made are:

Engineering, also Mining and Automobile Industries. Rubber is used for protecting wearing surfaces and the insulation of running machinery.

Railways. A report on the use of rubber in rolling stock, where the potentialities of increased consumption are very great, is to be widely distributed.

Textile Industry. Important organizations are conducting investigations into the use of latex.

Rubber Upholstery. There has been successful development of various types: sponge, pneumatic, and hair impregnated with latex.

Rubber Flooring. Here the industry possibly has one of the biggest potential outlets for its raw commodity. So far price has limited the demand for domestic purposes, but recently success has been achieved with the manufacture, by a modified process, of a new type of rubber flooring which is cheaper, can be stacked in rolls in retail stores, and is available in large quantities for domestic use.

The chairman also announced that the Federated Malay States Government had approved a recommendation from the Advisory Board that £100,000 might be set aside to finance schemes of research and propaganda approved by the Rubber Experimental Research and Propaganda Fund.

Finally, in regard to restriction, Mr. Hay pointed out that, although all kinds of means had been resorted to in order to maintain prices of a whole list of commodities, these attempts so far had failed. Restriction of rubber, if it is to be at all successful, must be so wide that it establishes a virtual monopoly of supplies.

At the conclusion of the meeting the new officers were elected: Sir Herbert Wright, chairman; and N. C. S. Bosanquet, vice-chairman.

New Paving Material

The *India Rubber Journal* learns of a new cheap, porous type of rubber-containing product for which a number of uses, including matting or paving in athletic grounds and similar places, are claimed and contemplated.

It seems that the material has already been used as matting in the run-up and take-off of the long jump at Stamford Bridge Athletic Ground with such success that it is proposed to lay an additional stretch. A mat of this kind was also put down in the Icedrome in London in such a position that it would be continually walked upon by the skaters while wearing their skates. After prolonged trial it was reported entirely satisfactory.

This new material is intended primarily for hard courts and similar pavings. It is composed essentially of waste rubber and one or more selected minerals, cindery or earthy materials of a porous nature, bonded by treatment with rubber latex mixed with a residue containing a certain proportion of free sulphur. Migration of some of the sulphur from the waste vulcanized rubber, together with the sulphur taken up from the residue, is claimed to cause vulcanization of the latex content on the spot. According to the intended use, other ingredients may be added.

The simplest and cheapest form of the material is exceedingly tough, yet flexible and porous; it may be produced as a dough and sold in airtight containers easily to be laid and spread on the site, or it may be formed into sheets, rolls, mats, or slabs, adapted for a number of uses and easy to attach to any foundation. The use of the material for hard courts seems to be particularly advantageous, and the cost is said not to exceed that of the best asphalted or bituminous court.

Marking Footwear

The Board of Trade announces that it has referred to the Standing Committee appointed under the Merchandise Marks Act, 1926, to make an Order in Council requiring the following imported goods to bear an indication of origin: (1) boots, shoes, and slippers made wholly or chiefly of rubber; (2) overshoes, including galoshes and snowboots, with or without heels, made of rubber or rubber combined with textile materials; (3) rubber-soled footwear with uppers wholly or chiefly of textile materials; (4) footholds made wholly or mainly of rubber.

Rubber Flooring

An interesting survey of some recent rubber flooring contracts by important British rubber manufacturers is published in the *India Rubber Journal,* which shows the increasing appreciation of such flooring for hotels, banks, post offices, business offices, etc. Of the many orders recently completed by the North British Rubber Co. is one for the Eccleston Hotel, the only hotel in London (and possibly anywhere) in which rubber has been used to the total exclusion of other floor-covering materials. Rubber flooring has been used everywhere in the building, including corridors, bathrooms, lobbies, bedrooms, etc.

This same concern still has to carry out an order for flooring the Highgate Tube Station in London, probably the first time in which rubber flooring has been used in a tube station. The company also reports increased demand for rubber flooring in the home, especially for bathrooms.

The Leyland & Birmingham Rubber Co. counts among its many rubber-flooring jobs, orders for the two latest boats of the Union-Castle Mail Steamship Co., and for the new Canadian Pacific liner *Empress of Britain.*

The Avon India Rubber Co. is doing an increasing trade in domsetic qualities of

rubber flooring. The company now supplies a ¼-inch thick fabric-backed flooring at 7 shillings 6 pence per square yard, in any plain or marbled color and in either 36-inch or 48-inch width. It seems that in the case of new constructions, builders are now laying rubber flooring direct on concrete, thus saving the double cost of floor-covering to the tenant and floor boards to the builder.

Contracts for picture houses, offices, showrooms, stores, hospitals, and ships are included among the orders of the Iaco Rubber & Waterproofing Co.

Macinlop's also reports numerous jobs undertaken in the last six months. Of these one was the laying of between 3,000 and 4,000 square yards of flooring in the new Thames House Building, Millbank.

FRANCE

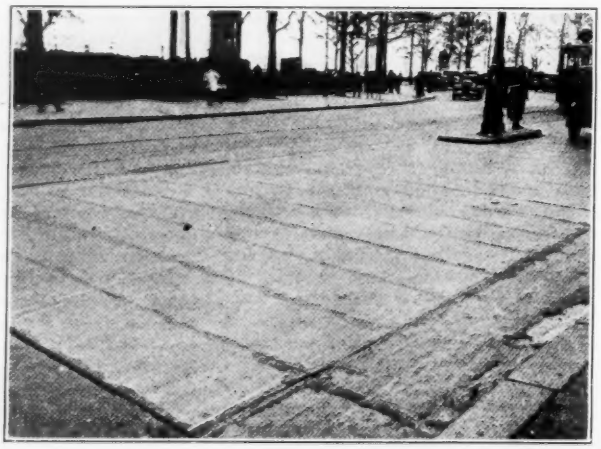
The *Revue Générale du Caoutchouc* reports a novel experiment in rubber paving which was carried out over an area of about 300 sq. m. on the Quai de la Rapée between the Avenue Ledru-Rollin and the Boulevard Diderot, Paris, France.

Strictly speaking, it is not a question of paving in the ordinary sense that we have here to deal with, but rather a type of surfacing allied to the covering of floors; for instead of blocks, lengths of rubber, resembling nothing so much as conveyer belts, but without fabric and perfectly flat, have been used.

These bands are about 8 m. long by 0.80 m. wide and are made up of two layers of rubber; the surface layer is of a blackish gray compound, about 6 mm. thick, while the lower layer is 20 mm. thick and rests immediately on the prepared road bed of concrete, over which a cementing mixture is poured at the time when the rubber cover is to be put in place. Adhesion between roadbed and cover is secured by passing a roller over the rubber surface.

The bands have been supplied by the Manufacture de Tapis of Clermont-Ferrand.

It is interesting to note that two years ago a section was paved with Gaisman blocks not far from the site of the present experiment. The Gaisman blocks appear to be standing up well under the traffic and will offer a valuable means of establishing the comparative value of the two methods.



Rubber Paving on the Quai de la Rapee, Paris, France

Rev. gén. Caoutchouc.

GERMANY

Factice and Antimony Sulphuret

Factice and golden sulphuret of antimony, are two compounding ingredients once popular but now greatly neglected except by a few of the more conservative firms. Is it right, asks a writer in a recent issue of the *Gummi-Zeitung*, to pay so little attention to these tried ingredients? He goes on to suggest that research laboratories should take up this work, for factice helps to overcome many difficulties caused by the rather freer use of crude rubber induced by the present low price of the commodity. Sheets and tubes get a smoother finish; less solvent is required; and the crude rubber does not have to undergo so much preliminary milling. Finally, if used in judicious amounts, factice does not induce early aging and deterioration.

As for golden sulphuret of antimony, the writer mentions two articles made of a compound containing 20 and 33 parts of this material respectively, which have been in constant use for 15 to 20 years and are still in good condition today. In this day of keen competition the possibilities of these old-time favorites should be recognized.

Hygiene Exposition

The International Hygiene Exposition opened at Dresden on May 6, and it was noted that the former exposition had evidently left a very good impression because greatly increased interest was shown in the affair, particularly by foreign states which this year were much better represented in every way.

A number of rubber manufacturers exhibited their specialties, of which, however, nothing particularly new is reported. But attention is called to the fact that in the agricultural section a spick-and-span, hand-driven milk cart, a necessity in the country districts in various parts of Europe, was equipped with light rubber-tired wheels instead of the customary, heavy wooden ones. It is remarked that a wide variety of carts of this type is still supplied with cumbersome wheels which not only require much more effort to move but are also very noisy, while rubber-tired wheels would reduce both labor and noise.

Meeting of the Dechema

The Fifth General Meeting of the Dechema of the German Society for Chemical Apparatus took place in Vienna from May 28-30. A number of experts met, and twelve comprehensive papers were read on the separation of solid and fluid substances. The newest methods of filtration in laboratory as well as in the factory, decantation, separation of solids from fluids by spraying, crystallization, flotation, besides some special filters were treated.

Company Notes

The Gummiwarenfabrik M. Steinberg, Köln-Braunsfeld, has just celebrated its fiftieth anniversary. The firm was founded in May, 1881, by Max Steinberg, of Kohn-Lindenthal, who died some years ago. The firm, which was started on a very small scale, has been developed into an important one in its field with worthwhile connections at home and abroad. It has become world known through its dress shields manufactured according to important new methods and with the help of the newest machinery. Other specialties of the concern are their attractive rubber aprons, bathing caps, seamless goods of all kinds, including surgical goods, besides many other articles. At present the company is in the fortunate position of being fully occupied in all departments and shows the highest number of employes, over 1,000 persons, since its foundation.

The Continental Gummiwerke A.G., Hannover, reports net profits of 3,642,065 marks for the past business year, and distributes a dividend of 8 per cent. The year 1930 was a disappointing one, and owing to the unusually difficult situation the company's sales at home and abroad declined about 16 per cent. Almost all the articles manufactured by the firm were affected by the world crisis, and the shrinkage in sales has led to unusually keen competition in the entire rubber industry. Taking these factors into consideration the results obtained are on the whole considered satisfactory.

Concerning the firm's different subsidiaries, we learn that the International Continental Caoutchouc Compagnie, Amsterdam, which conducts the foreign sales business, has this time booked a small loss.

After October, 1929, the entire works of the Liga Gummiwerke A.G., Frankfurt a. M.-Hausen, were taken over by the Continental company. It was, however, found necessary to stop operations entirely in Frankfort a. M. and to a large extent in the Waltershausen works. On the other hand the former Peter's Union works in Corbach is more suitable for manufacturing and is being used more than ever.

Complaint is made that government decisions to decrease the burden of taxation have not been far-reaching enough, and that in the case of social levies these are actually higher. The company had to pay under this item 7,862,804 marks in 1928, 11,030,826 in 1929, and 8,463,531 in 1930; while it paid out as profits to its shareholders 2,385,000 marks in 1928, 3,605,000 in 1929, and 3,205,000 marks in 1930.

Rubber Industry in Far East

MALAYA

Planting Since 1926

At a recent meeting of the Federal Council, Egmont Hoke asked whether the government would supply data concerning the number and the acreage of registered applications for rubber cultivation during the five years 1926-1930 by holders of gardens under 25 acres, from 25 to 100 acres, and by estates of 100 acres and over. Information was also requested regarding the acreages of such applications approved by the government.

Below are the figures for the five years for the different groups divided among the various states:

	Number and Acreage of Applications During 1926-1930		Number and Acreage of Approval Applications During 1926-1930	
Holdings Under 25 Acres				
	Number	Acreage	Number	Acreage
Perak	19,750	79,584	3,774	13,086
Selangor	2,934	17,011	3,903	12,869
Negri Sembilan ..	13,052	51,751	5,219	15,292
Pahang	3,824	23,685	2,234	10,734
Totals	39,560	172,031	15,130	51,981
Holdings from 25-100 Acres				
	Number	Acreage	Number	Acreage
Perak	458	21,121	38	1,819
Selangor	315	14,876	27	1,189
Negri Sembilan ..	504	20,902	67	2,870
Pahang	431	18,506	118	5,203
Totals	1,708	75,405	250	11,081
Estates Over 100 Acres				
	Number	Acreage	Number	Acreage
Perak	257	107,816	45	14,017
Selangor	230	170,213	35	20,026
Negri Sembilan ..	292	245,712	65	56,155
Pahang	439	640,676	95	83,007
Totals	1,218	1,164,417	240	173,205

As the *Straits Times* observes in commenting on the above data, the figures are astonishing; and had new planting not been so drastically restricted, the area alienated for rubber during the past four years to estates of over 100 acres, would have exceeded by over 200,000 acres the planted area actually comprised by this class at the end of 1929. A planting boom was, therefore, prevented by the action of the Government. Incidentally it is interesting to note that the percentage of applications by small holders that was approved was considerably greater than that of the percentage for large estates.

Untapped Areas

Figures issued by the Deputy Registrar-General of Statistics show that the total untapped area on estates of 100 acres and over in the F. M. S. and the S. S. during March, 1931, was 178,499 acres. Of this, 43,307 acres referred to areas where tapping has ceased entirely and 135,192 acres to areas which were temporarily out of tapping. The area where tapping has been stopped entirely in the F. M. S. was 30,026, and 13,281 acres in the S. S.; while the areas temporarily out of tapping were 95,817 and 38,375 acres respectively.

Areas rested because of the adoption of A. B. C. and similar tapping systems are not included in the above figures. The total of such areas in March, 1931, was 36,035 acres in the Federated Malay States and 8,665 acres in the Straits Settlements, in all 44,700 acres.

Rubber Paving

It may be remembered that the previous rubber slump greatly stimulated activities of local planters in finding new uses for rubber. Because of the large amounts of rubber that could be utilized, if a suitable type were evolved, rubber paving in particular has engaged the attention locally; consequently some interesting inventions relating to paving blocks resulted. But even at that time a simpler and cheaper method of surfacing roads with rubber than by the use of blocks was sought, and R. Dury, of Kuala Kangsor, ten years ago patented a preparation which he called Duryroid, composed mainly of rubber, which he claimed could be used in much the same way as asphalt.

The basic Duryroid mixture contains 70 per cent of any grade of rubber. The rubber after being plasticized and thoroughly mixed with the necessary ingredients is made into thin sheets and combined with mineral oil. In this state asphalt and Portland cement are added; after this addition the preparation is ready to be poured on the road. A portion of the main road at Kuala Kangsor nearly ten years ago was treated with Duryroid and was found to stand the test fairly well. At that time the cost of laying Duryroid was $10 (Straits currency) for an area 25 by 12 feet. *The Malayan Tin and Rubber Journal* learns that this product will be considered among others which the Rubber Research Institute might examine and possibly test on a practical scale in the near future.

This paper also understands that R. W. Kendall, manager, Pinji Estate, Lahat, is interested in preparing a rubber road surface and has experimented with his product on the road opposite the estate factory. A few years ago Mr. Kendall and David Graham carried out successful experiments in producing a form of petrol and liquid fuel from rubber scrap; besides they also produced from rubber an oil which they showed could be used for anti-malaria oiling purposes.

An important experiment in road-making is also being conducted in Singapore by Barlow & Co., in cooperation with the local municipality. An area of 60 sq. yds. is being prepared under the direction of G. Parry Davis, whose process is being tested. Mr. Davis's preparation contains 20 per cent of rubber, part of which is in latex form, and the total amount of rubber required for the 60 sq. yds. is said to be roughly 1,500 pounds. At present the product is simply mixed by coolies in a steel drum, much as concrete is mixed and then poured on the prepared roadbed. The site of the experiment is one subjected to heavy traffic; so results of this new paving will be watched with the greatest interest.

Rubber Committee

An informal gathering, representative of European and Asiatic proprietary planters, took place recently at Choo Kia Peng's house to discuss the formation of a general purposes committee to watch the rubber situation as it affects all classes in the F. M. S. To secure general representation it was decided to invite planting associations and chambers of commerce to nominate men to form the proposed committee, and it was also suggested that one or two private individuals who do not belong to any particular association might also be invited to become members.

SOUTH INDIA

Sun-scorch of young budded plants, a sufficiently serious trouble to call for a warning to estate managers by R. C. Taylor, of the Rubber Experimental Station, Mundakayam, has been observed and reported from six widely separated estates in South India, as well as on the local experiment station. The bark on the lower six inches of the scion, on the side facing south, southeast, or southwest dies; it presents a dried, sunk, and frequently cracked appearance. On scraping, the dried bark comes away readily, revealing discolored wood and in old cases the beginnings of callousing over. To limit the affected area on plants already attacked, scraping of the dead bark is recommended. Exposed wood should be tarred and the lower three feet of the plant shaded. The dying bark here noted seems to be due to the paucity and, in some cases, total absence of shade on South Indian clearings; consequently it is advised to grow hedges of *Tephrosia candida* or similar bush-forming leguminous plants in an eastern and western direction across clearings at a distance of about three feet from the young rubber.

It is also suggested that manurial treatment—about four ounces of nitrogen, in any form, per plant—in addition to shading may help in the early recovery of affected plants.

NETHERLANDS EAST INDIES

Replanting Old Areas

The problem of reconditioning old areas of rubber planted from unselected seed and consequently giving comparatively low yields is one that is demanding the attention of planters throughout the East, and is a particularly pressing one on those estates where little or no reserve lands are available for planting with buddings and selected seedlings.

Estates with ample resources can afford to cut out old rubber without delay and to replant the land with more up-to-date material, but for those with limited means this process is too costly.

Theoretically the most desirable procedure is to resort to rejuvenation of old areas; that is, cutting out the least productive members and planting up the spaces made free with high-yielding material. On the face of it this method has a double advantage: the drastic thinning out results in increased outputs from those remaining, while at the same time the new, high-grade plantations develop. In practice, however, it has been found that the increased output from the old trees owing to thinning out is inconsiderable; while the shade from the large, old trees and their highly developed root systems prove detrimental to the growth of the new, young plants.

It has, therefore, been recommended to tap old trees heavily for a few years in order to obtain as much extra profit as possible from them and then to cut them all out and start over with proven material.

Actual tapping to death is no longer advised, for here again theory and practice do not agree; and it has been found that long before the time planned, in many cases, even a few months after initiation of the system, the majority of the trees run dry.

At a recent planters' meeting at Semarang, J. Th. de Haan discussed this subject and gave some interesting data on results obtained on estates in Western and Central Java with a system of heavy tapping, but not tapping to death.

On the Tjiseroe estate in West Java such a system was started for the first time in 1922. In a certain section tapping, two cuts over half the circumference, down to the wood, was begun; in three years' time all the available bark was consumed, and the output obtained was three times as much as with a normal tapping system. Other estates followed this example with results, on the whole, that equaled and in one instance even surpassed the above. In Central Java few experiments of this kind have been undertaken, but Mr. de Haan quotes quite satisfactory results from various blocks on one estate. The trees here had been planted between 1907 and 1909 so that a large number of the trees were about twenty-two years old when the experiment was begun in 1929. In periods varying from eleven to fourteen months the heavier tapping system resulted in crops that exceeded those obtained normally by as much as 674 kilos per hectare, while even the poorest area, which normally yielded 236 kilos per hectare per annum, produced 595 kilos per hectare in eleven months.

The method, therefore, appears to pay. Yet Mr. de Haan adds a word of caution. Conditions vary considerably on individual estates; preliminary tests should, therefore, be carried out to determine how heavy a tapping system the trees can stand. A less severe system should be started with, which can be increased to correspond to the resistance of the trees.

Bosch Tapping System

Much has been said and written about this system, the invention of an old Dutch planter. In some cases the system, which requires the special, patented Bosch tapping knife, has been extravagantly praised and in others again it has been just as strongly decried.

Systematic tests have now been carried out with the system, and it has been found that it gives no practical advantage over other systems. In some cases there was even serious reduction in the output after the Bosch system was started. In only one case was there an appreciable gain, about 40 per cent, but this was ascribed to the fact that on the estate where this tapping occurred the Bosch system had the effect of considerably increasing the length of the cut.

With the Bosch knife it is indeed possible to shave off much thinner strips of bark, but the costs of tapping are increased and finally the knife itself, which is very much more expensive than the usual gage or knife employed, wears out comparatively soon, in one case in from four to six months.

Sixth Native Report

The sixth report on Native Rubber Cultivation has just been issued by the Netherlands Indies Department of Agriculture, Buitenzorg, Java. An attempt is made to explain the various causes contributing to the rise in exports of native rubber since October, 1930.

In the first place it seems that the slight recovery in the world market caused an important rise in the prices on the domestic markets of Palembang, Djambi, and other districts. The exaggerated price movements on the domestic markets are illustrated by the fact that during the first half of October prices of rubber a week old fell to 8 and 7 guilder cents per kilo, and even to 6 cents in some localities (guilder = $0.40; kilo = 2.2 pounds); but in the beginning of November they rose to 10 and 11 cents, and toward the end of the month even 14 and 15 cents were quoted here and there. At the same time, however, blanket quotations at Singapore merely fluctuated from the lowest point of 10 cents per pound on the first of October, to 11½ cents at the beginning of November, and 13 cents at the end of the month.

Similar movements have been observed from time to time in the past.

However, a more important cause for the continued activities of native smallholders lies in the need for cash to pay taxes, army ransom money, and for the month of Puasa and celebrating the Lebaran. Tapping rubber offers the easiest and quickest way for obtaining the necessary cash. Another very important factor in the situation is that the natives have resigned themselves to a lower standard of living; while in addition to this change, the great general decline in prices of the prime necessities of life, and even of imported goods, makes them satisfied with a lower income. This important aspect of the situation was also brought out in these columns in a recent issue of India Rubber World.

Finally there is to be considered the greatly increased capacity for production of native rubber because of the increased number of trees that have now reached the tapping stage, and the increased productivity of the large areas planted during 1924-1927.

An examination of the details regarding shipments of native rubber from the different districts reveals that those for West Borneo show hardly any decline in 1930 as compared with 1929, the figures having been 20,311 against 20,315 tons; while the January, 1931, exports from this territory were the highest since August, 1930. Shipments from Benkoelen, Lampongs, Banka, Billiton. All districts which took up rubber planting at a much later date than the others, have dropped severely, and in the case of the first two have ceased altogether.

Exports from East Coast Sumatra, Atjeh, Tapanoeli, Riouw, Djambi, and Palembang, all declined during 1930 as compared with 1929, but it is to be noted that in most instances, particularly in the case of Djambi and Palembang, the January, 1931, shipments were the highests in months. As March shipments showed a further increase, the upward swing seems to be continuing.

In going over the figures it is worth while noting that in many provinces the dry weight percentage has increased. This rise is particularly noticeable for Palembang and Djambi, the latter of which used to be notorious for the high percentage of moisture and impurities in the native product. This improvement is partly due to the costs of transportation, which are very high for wet rubber, and partly to the activities of the remilling factories of the Netherlands Rubber Unie.

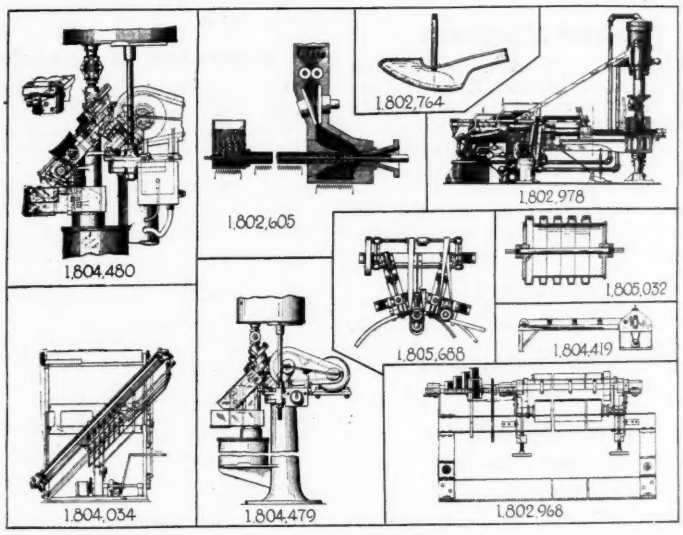
The total exports in 1930 were even below those of 1928, and compared with 1929, show a decline of 16.7 per cent. The table below shows the estimated potential production, actual output, and prices since 1927:

	Potential Production (Dry) Metric Tons	Actual Production (Exports Dry) Metric Tons	Ratio of Actual to Potential Per Cent	Average Yearly Price Standard @ Batavia Guilder Cents Per ½ Kilo
1927	100,000	100,491	100	99.00
1928	110,000	91,353	83	58.50
1929	120,000	108,584	90	54.00
1930	150,000	90,096	60	30.75
1931	200,000	.....	...	.....
1932	250,000	.....	...	.....
1933	300,000	.....	...	.....

POLAND

It is reported that the directors of the "Pepege" Rubber Works, Graudenz, have put the concern into the hands of liquidators. At the same time the concern gave notice to all its 3,000 employes.

Patents, Trade Marks, Designs



Machinery

United States

1,802,605.* **Insulating Cables.** This machine relates to manufacturing submarine cables in which continuous loading material is employed which has properties varying with strain. The loading layer is protected from strain by being separated from the surrounding insulation by a layer of viscous material. A. R. Kemp, Westwood, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

1,802,764.* **Shoe Dipping Form.** A rubber shoe is formed on an aluminum shoe last within which is a chamber with passages through the side walls of the last. A valve stem attached to the top of the last applies suction to the interior of the last to hold the usual insole or an insole and foxing in place during the dipping process. A. W. Holmberg, S. Orange, and P. H. Watkins, Leonia, both in N. J., assignors to Goodyear's India Rubber Glove Mfg. Co., Naugatuck, Conn.

1,802,968.* **Stock Cutter.** Rubber sheeting material is automatically severed across its entire width and in any desired lengths. The material is conveyed to the machine by an endless belt conveyer from heated calender rolls. W. D. Everett and A. Williams, Jr., both of Watertown, Mass., assignors to Hood Rubber Co., Inc., Wilmington, Del.

1,802,978.* **Molding Machine.** This machine is designed for filling several mold cavities with rubber composition in a unitary operation by forcing the material into the cavities as they pass under a die aperture in a source of supply under pressure. F. J. MacDonald, Ellet, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,804,034.* **Cutting and Stripping.** Webs of rubber coated material are cut into sections such as are commonly used in making tires, hose, etc. The machine includes provision for a stripping mechanism of improved construction and efficiency. W. W. Spadone, New York, and C. C. Spadone, Rockville Center, both in N. Y.

1,804,419.* **Valve Stem Remover.** A mechanism is adapted for removing metal valve stems from old inner tubes in order that the rubber may be reclaimed. E. Hutchens, Cudahy, Wis., assignor, by mesne assignments, to H. Muehlstein & Co., Inc., New York, N. Y.

1,804,479.* **Marking Machine.** This apparatus is for marking and applying rubber cement to the edges of rubber shoe uppers and the foxings to be united with them in order to make a watertight union between these parts. H. R. Polleys, New Haven, Conn., assignor to National India Rubber Co., Bristol, R. I.

1,804,480.* **Cement Applying Machine.** Cement is applied by this machine to uppers and soles of shoes to provide sufficient adherence for rubber strips and soles in solid contact. The cementing can be done so that it will have a straight edge and will have a bead at its edge where it is most likely that the foxing will be pulled loose in service. H. R. Polleys, New Haven, Conn., assignor to National India Rubber Co., Bristol, R. I.

1,805,032.* **Endless Belt Drum.** A series of specially formed ring sections are arranged on a shaft to form a drum with V-shaped grooves. The rings are held together by a pair of disks adjusted to the ends of the shaft. In the grooves of the assembled drum V-shaped endless belts can be built and vulcanized. J. D. Berwick, assignor to Goodyear Tire & Rubber Co., both of Akron, O.

1,805,688.* **Tire Bead Stripper.** An improved method of slicing strips of rubber and fabric from around the wire core ordinarily present in a tire bead effects a saving of waste. M. E. Davis, Grand Rapids, Mich., assignor by mesne assignments, to Leo Meyer Co., Akron, O.

1,803,065. **Tube Repair Holder.** G. L. Knapp, Maywood, Ill.

1,804,209. **Tire Electric Annunciator.** N. R. Cowperthwait, Silver Lake, Kan.

1,804,222. **Tire Replacing Machine.** J. J. Mascuch, Newark, N. J.

1,804,481. **Latex Applying Machine.** H. R. Polleys, New Haven, Conn., assignor to National India Rubber Co., Bristol, R. I.

1,804,970. **Pressure Measuring Instrument.** R. W. Brown, assignor to Firestone Tire & Rubber Co., both of Akron, O.

1,805,145. **Impregnating Apparatus.** C. Koops, New York, assignor to J. P. Devine Mfg. Co., Buffalo, both in N. Y.

1,805,275. **Forming Press.** J. W. Bishop, Muskegon, Mich., assignor to Brunswick-Balke-Collender Co., Chicago, Ill.

1,805,497. **Tire Inflater.** W. A. Harris, Greenville, S. C.

Dominion of Canada

310,903. **Ejector Mold.** Joseph Stokes Rubber Co., Ltd., Welland, Ont., assignee of M. H. Martindell, Trenton, N. J., U. S. A.

311,089. **Pneumatic Tire Machine.** Goodyear Tire & Rubber Co., assignee of E. F. Maas, both of Akron, O., U. S. A.

311,176. **Tire Handling Machine.** D. T. Blackmon, Columbia, S. C., U. S. A.

311,280. **Teat Cup Liner Cutter.** De Laval Separator Co., New York, assignee of J. L. Hulbert, Poughkeepsie, both in N. Y., U. S. A.

311,289. **Watch Case Heater.** General Tire & Rubber Co., assignee of H. A. Denmire, both of Akron, O., U. S. A.

311,463. **Footwear Manufacturing Device.** D. F. Wilhelmi, Oosterbeek, Gelderland, The Netherlands.

311,511. **Article Spraying Machine.** Dunlop Tire & Rubber Goods Co., Ltd., assignee of E. Littlejohn and P. E. Gill, co-inventors, all of Toronto, Ont.

311,715. **Pile Fabric Machine.** Lea Fabrics, Inc., Newark, assignee of P. S. Smith, Summit, both in N. J., U. S. A.

311,745. **Leather Substitute Base Material.** Stedfast Rubber Co., Inc., Mattapan, assignee of J. J. Clifford, Reading, both in Mass., U. S. A.

United Kingdom

341,987. **Overshoe Upper Machine.** H. Baron, London. (Miller Rubber Co., Akron, O., U. S. A.)

342,788. **Fastener Inserter.** British United Shoe Machinery Co., Ltd., F.

* Pictured in group illustration.

B. Keall, and C. F. R. Jeavons, all of Leicester.

343,790. **Belt Vulcanizing Press.** E. Siempelkamp, Krefeld, Germany.

344,345. **Tire Vulcanizer.** Firestone Tyre & Rubber Co., Ltd., Middlesex. (Firestone Tire & Rubber Co., Akron, O., U. S. A.)

344,414 and 344,415. **Impregnating Machine.** J. E. C. Bongrand, Paris, and L. S. M. Lejeune, Nord, both in France.

Germany

526,120. **Vulcanization Mold.** W. B. Burke, East Cleveland, O., U. S. A. Represented by E. Lamberts, Berlin S.W.61.

Designs

1,171,306. **Dipped Glove Mold.** F. Bruggemann, Munich.

1,171,454. **Sole Vulcanizer.** Schuhmaschinenfabrik Fulda G.m.b.H., Fulda.

Process

United States

18,068 (Reissue). **Ornamenting Toy Balloons.** A. P. Witten, assignor to G. E. Hall and himself, both of Akron, O.

1,802,491. **Annular Tube.** H. L. Young and G. Foerstner, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

1,802,985. **Composite Product.** W. L. Semon, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,804,157. **Processing of Latex.** R. F. Elder, Portland, Me., and R. B. Hill, assignors to Brown Co., both of Berlin, N. H.

1,805,026. **Securing Tread to Tire Carcass.** W. C. State, assignor to Goodyear Tire & Rubber Co., both of Akron, O.

1,805,146. **Tire.** L. A. Laursen, assignor of one-fourth to P. L. Laursen, both of Akron, O.

1,805,245. **Fibrous Material and Rubber.** E. Hopkinson, New York, and W. A. Gibbons, Little Neck, L. I., assignors to New York Belting & Packing Co., New York, all in N. Y.

Dominion of Canada

310,817. **Aqueous Rubber Dispersions.** Anode Rubber Co., Ltd., London, E. C. 2, England, assignee of F. Gabor and P. Klein, both of Budapest, Hungary, and A. Szegvari, Akron, O., U. S. A.

310,818. **Aqueous Rubber Dispersions.** Anode Rubber Co., Ltd., Guernsey, Guernsey, assignee of P. Klein, Budapest, Hungary.

310,819. **Aqueous Rubber Dispersions.** Anode Rubber Co., Ltd., Guernsey, Guernsey, assignee of P. Klein and F. Gabor, both of Budapest, Hungary.

311,471. **Rubber Goods Production.** Anode Rubber Co., Ltd., Guernsey, Guernsey, assignee of W. C. Geer, New Rochelle, N. Y., and B. Dales, Fairlawn, O., co-inventors, both in the U. S. A.

311,509. **Rubber and Paper Product.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of R. P. Rose, Jackson Heights, L. I., N. Y., and H. E. Cude, S. Manchester, Conn., co-inventors, both in the U. S. A.

311,536. **Molded Boot.** Hood Rubber Co., Inc. (a Del. corp.), assignee of Hood Rubber Co. (a Mass. corp.), assignee of A. A. Glidden and T. M. Knowland, co-inventors, all of Watertown, Mass., U. S. A.

United Kingdom

343,921 and 343,922. **Ball.** Dunlop Rubber Co., Ltd., London, E. A. Murphy and R. G. James, both of Fort Dunlop, Birmingham.

344,875. **Aqueous Rubber Dispersions.** Soc. Italiana Pirelli and U. Pestalozza, both of Milan, Italy.

344,956. **Floor Covering Material.** N. Kenyon, Sheffield, and Spen Rubber Works, Ltd., Yorkshire.

Germany

526,051. **Making Footballs.** A. Candi, Milan, Italy. Represented by W. Ziegler, Berlin-Charlottenburg.

Chemical

United States

1,802,740. **Compounding.** W. A. Steinle, Flushing, N. Y., assignor to Naugatuck Chemical Co., Naugatuck, Conn.

1,802,752. **Age Resister.** S. M. Cadwell, Leonia, and L. Meuser, Bergenfield, both in N. J., assignors to Naugatuck Chemical Co., Naugatuck, Conn.

1,802,753. **Latex Treatment.** S. M. Cadwell, Leonia, N. J., and E. Hazell, New York, N. Y., assignors to Naugatuck Chemical Co., Naugatuck, Conn.

1,802,761. **Latex Treatment.** W. A. Gibbons, Great Neck, N. Y., assignor to Naugatuck Chemical Co., Naugatuck, Conn.

1,802,866. **Latex Treatment.** A. Biddle, Trenton, N. J., assignor to United Products Corp. of America, a corporation of Del.

1,802,867. **Aqueous Dispersion.** A. Biddle, Trenton, N. J., assignor to United Products Corp of America, a corporation of Del.

1,804,226. **Accelerator.** J. A. Nieuwland, Notre Dame, Ind., assignor to Canadian Electro Products Co., Ltd., Montreal, Canada.

1,804,398. **Accelerator.** S. M. Cadwell, Leonia, N. J., and A. T. Maximoff, New York, N. Y., assignors to Naugatuck Chemical Co., Naugatuck, Conn.

1,805,057. **Accelerator.** J. Teppema, assignor to Goodyear Tire & Rubber Co., both of Akron, O.

1,805,103. **Accelerator.** D. H. Powers, Penns Grove, N. J., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.

1,805,517. **Composition.** W. Feldenheimer, London, England.

1,805,712. **Rubber Treatment.** C. E. Bradley and C. Ferrettie, assignors to Mishawaka Rubber & Woolen Mfg. Co., all of Mishawaka, Ind.

1,805,713. **Rubber Treatment.** C. E. Bradley, assignor to Mishawaka Rubber & Woolen Mfg. Co., both of Mishawaka, Ind.

1,806,040. **Age Resister.** H. G. Byers, New York, N. Y., assignor to Rubber Service Laboratories Co., Akron, O.

1,806,388. **Aqueous Rubber Dispersion.** R. A. Crawford, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,806,547. **Rubber Manufacture.** T. Midgley, Jr., C. A. Thomas, and C. A. Hochwalt, all of Dayton, O., assignors to General Motors Corp., Detroit, Mich.

Dominion of Canada

310,827. **Compounding.** Barrett Co., New York, N. Y., assignee of A. B. Crowdery, Needham, Mass., and T. A. Bulifant, Maywood, N. J., all in the U. S. A.

310,956. **Elastic Plastic Material.** J. Baer, Basel, Switzerland.

311,096. **Composition.** International Standard Electric Corp., New York, N. Y., U. S. A., assignee of M. C. Field, London, W.C.2, England.

311,287. **Accelerator.** I. G. Farbenindustrie A. G., Frankfort a. M., assignee of T. Weigel, Köln-Mülheim, both in Germany.

311,522. **Composition.** I. G. Farbenindustrie A. G., Frankfort a. M., assignee of O. Schmidt and B. Schnell, both of Ludwigshafen a. Rhine, and E. Meyer, Mannheim, co-inventors, all in Germany.

311,538. **Age Resister.** Imperial Chemical Industries, Ltd., London, S.W.1, assignee of S. Coffey and W. J. S. Naunton, co-inventors, both of Manchester, all in England.

311,677. **Aqueous Dispersions.** Brown Co., assignee of R. B. Hill, both of Berlin, N. H., U. S. A.

311,678 and 311,679. **Conditioning Latex.** Brown Co., Berlin, N. H., assignee of R. B. Hill, Peabody, Mass., both in the U. S. A.

United Kingdom

342,654. **Dentifrice.** N. Takeuchi, Tokio, Japan.

343,617. **Rubber Goods Reenforcement.** H. Suter, Zurich, Switzerland.

343,879. **Composition.** N. Swindin and Nordac, Ltd., both of Wealdstone, Middlesex.

343,921 and 343,922. **Rubber Composition.** Dunlop Rubber Co., Ltd., London, E. A. Murphy and R. G. James, both of Fort Dunlop, Birmingham.

343,940. **Rubber Antiager.** O. Y. Imray, London, assignee of Soc. of Chemical Industry in Basle, Basle, Switzerland.

343,970. **Proofing Composition.** Compagnie Centrale des Emeris et Produits a Polir, Sérurier, Paris, France.

343,977. **Plastic Composition.** British United Shoe Machinery Co., Ltd., and H. Barnett, both of Leicester.

344,070. **Compound Fabrics.** British United Shoe Machinery Co., Ltd., E. W. Ricks, and W. J. Lund, all of Leicester.

344,174. **Rubber Antiager.** Naugatuck Chemical Co., Naugatuck, Conn., assignee of C. Coleman, Passaic, N. J., both in the U. S. A.

344,265. **Accelerator.** Imperial Chemical Industries, Ltd., Milbank.

344,346. **Latex Treatment.** C. J. M. M. Le Petit, Enghien-les-Bains, Seine-et-Oise, France.

344,406. **Antiscorch Material.** A. C. Burrage, Ipswich.

344,469. **Strip Sealing Material.** L. Rado, Berlin, Germany.

344,489. **Tablet Compound.** J. B. E. Lambrecht, C. Decorte, and Soc. Anon Chemifax, all of Oost-Roosebeke, Belgium.

344,491. **Preserving Rubber.** A. Carpmael, London. (I. G. Farbenindustrie A.G., Frankfort a. M., Germany.)

344,530. **Puncture Filling Composition.** B. G. Crabbe, Newton Abbot, Devon.

344,533. **Coloring Rubber.** H. D. Elkington, London. (Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij, The Hague, Netherlands.)

344,537. **Rubber Dispersions.** Dunlop Rubber Co., Ltd., London, R. G. James and D. F. Twiss, both of Fort Dunlop, Birmingham.

344,586. **Fibrous Composition.** N. Kenyon, Sheffield, and Spen Rubber Works, Ltd., Heckmondwike.

344,602. **Sponge Rubber Composition.** Dunlop Rubber Co., Ltd., London, W. H. Chapman and D. W. Pounder, both of Fort Dunlop, Birmingham.

344,647. **Latex.** Naugatuck Chemical Co., Naugatuck, Conn., assignee of J. McGavack, Leonia, N. J., both in the U. S. A.

344,690. **Accelerator.** Naugatuck Chemical Co., Naugatuck, Conn., assignee of S. I. Strickhouser, Passaic, N. J., both in the U. S. A.

344,772. **Puncture Sealing Composition.** B. G. Crabbe, Newton Abbot, Devon.

345,239. **Colored Synthetic Rubber.** I. G. Farbenindustrie A. G., Frankfort a. M., Germany, and J. Y. Johnson, London.

Germany

524,668. **Polymerizing Diolefines.** I. G. Farbenindustrie A.G., Frankfort a.M.

524,752. **Attaching Rubber to Metal.** Anode Rubber Co., Ltd., London, England. Represented by R. and M. M. Wirth, C. Weihe, H. Weil, all of Frankfurt a. M.; and T. R. Koehnhorn and E. Noll, both of Berlin S.W.11.

525,163. **Mold Cleaner.** Herold A.G., Hamburg 33.

525,444. **Making Rubber.** Anode Rubber Co., Ltd., London, England. Represented by W. Karsten and C. Wiegand, both of Berlin S.W.61.

525,445. **Vulcanizing Apparatus.** Goodyear Tire & Rubber Co., Akron, O., U. S. A. Represented by G. Loubier, F. Harmsen, E. Meissner, F. Vollmer, and H. Toussaint, all of Berlin S.W.61.

526,121. **Rubberlike Masses.** J. Baer, Basle, Switzerland. Represented by G. Winterfeld, Berlin S.W.68.

526,303. **Separation of Rubber.** Siemens-Elektro-Osmose G.m.b.H., Berlin-Siemensstadt.

526,304. **Rubberlike Products.** I. G. Farbenindustrie A.G., Frankfort a.M.

526,498. **Rubberlike Substances.** I. G. Farbenindustrie A.G., Frankfort a.M.

General

United States

18,058 (Reissue.) **Rubber Article Lining.** C. E. Bradley and C. D. Mason, assignors to Mishawaka Rubber & Woolen Mfg. Co., all of Mishawaka, Ind.

1,802,447. **Lead Pencil Eraser.** C. W. Smith, Green Island, N. Y.

1,802,639. **Doorcheck.** H. J. and L. L. Estey, both of Lansing, Mich.

1,802,877. **Pneumatic Tire.** J. T. Crute, assignor of one half to M. A. Goode, both of Virgilina, Va.

1,803,019. **Roller Skate.** H. A. Holm, Cicero, Ill.

1,803,057. **Plug.** Z. A. Dyer, Whittier, Calif.

1,803,069. **Printing Roller.** F. Ossing, Cleveland, O.

1,803,121. **Polo Ball.** G. Meurisse, assignor to Charles Meurisse & Co., both of Chicago, Ill., a copartnership consisting of C. C., G., A., and R. C. Meurisse.

1,803,126. **Condenser Tube Slug.** W. F. Oberhuber, Lansdowne, assignor to Franklin Development Co., Philadelphia, both in Pa.

1,803,178. **Expansion Joint Material.** A. C. Fischer, Chicago, Ill., assignor to Philip Carey Mfg. Co., a corp. of O.

1,803,268. **Wind Instrument Mouthpiece.** F. Meyer and O. Link, both of New York, N. Y.

1,803,270. **Tire Valve and Gage.** L. E. Morrison, New York, N. Y.

1,803,339. **Mop Cleaning Receptacle.** C. H. McConnell, New York, N. Y.

1,803,373. **Tire Valve Cap.** J. Wahl, Rosedale, assignor to A. Schrader's Son, Inc., Brooklyn, both in N. Y.

1,803,559. **Overshoe.** R. E. Riley, Akron, O., assignor by mesne assignments, to Miller Rubber Co., Inc., Wilmington, Del.

1,803,584. **Car Truck.** H. W. Alden and N. R. Brownyer, assignors to Timken-Detroit Axle Co., all of Detroit, Mich.

1,803,641. **Heel Fastener.** L. Pignanelli, Tacoma, Wash.

1,803,937. **Cushion Connection.** A. J. Jansson, Flint, assignor to General Motors Corp., Detroit, both in Mich.

1,803,953. **Friction Wheel.** R. von Krenski, Berlin-Charlottenburg, Germany.

1,803,980. **Sock.** P. L. Schönfeld, Chemnitz, Germany.

1,804,027. **Link Mat and Border.** M. H. O'Toole, Everett, assignor to Boston Rubber Mat Co., Boston, both in Mass.

1,804,199. **Rubber Compound.** C. R. Boggs, Waban, and J. T. Blake, assignors to Simplex Wire & Cable Co., both of Boston, all in Mass.

1,804,244. **Aerial Toy.** V. Brady, New York, N. Y.

1,804,274. **Tank Protective Lining.** J. Poberejsky, Bois-Colombes, France.

1,804,294. **Inner Tube and Valve Stem.** F. H. Watson, Jonesboro, Ark.

1,804,474. **Electric Circuit Plug.** L. Martin, Long Beach, Calif.

1,804,755. **Tire Valve Dust Cap.** E. W. Eidemiller, Medina, Wash.

1,804,799. **Window Stripping.** F. C. Palenske, St. Joseph, and W. A. Robbins, Benton Harbor, both in Mich.

1,804,841. **Fabric Pad.** J. B. Pedroli, Los Angeles, Calif.

1,804,906. **Gear Silencer Construction.** E. E. Wemp, Detroit, Mich.

1,805,037. **Tire Tractive Device.** G. R. Burrell, assignor to Goodyear Tire & Rubber Co., both of Akron, O.

1,805,038. **Mat.** E. W. Derr, assignor to Rubber Craft Products Co., both of Akron, O.

1,805,045. **Pin and Clip Tray.** M. S. Lower, assignor to Sun Rubber Co., both of Barberton, O.

1,805,273. **Recoil Pad.** A. H. Ammann, assignor to Jostam Mfg. Co., both of Chicago, Ill., a copartnership composed of W. D. Stannard and A. H. Ammann.

1,805,279. **Fountain Pen Eraser.** W. M. Floyd, Cincinnati, O.

1,805,576. **Cushioning Strip.** B. B. Felix, Chicago, Ill.

1,805,633. **Goggles.** J. L. Moran and A. J. Lee, assignors, by direct and mesne assignments, of one-fourth to F. E. P. Wilder, all of Spokane, Wash., and one-fourth to R. Malcom, Chicago, Ill.

1,805,738. **Detachable Heel.** P. Lee, Windsor, Ont., Canada.

1,806,053. **Toy.** W. J. Gallagher, Cincinnati, O.

1,806,084. **Tread.** De F. Roe, Cleveland, assignor to Colson Co., Elyria, both in O.

1,806,103. **Bathtub Vacuum Headrest.** C. E. Tyler, Los Angeles, Calif.

1,806,341. **Cushion.** G. V. Gavaza, Quincy, Mass.

1,806,372. **Tire Pressure Indicator.** C. E. Stille, Tuckahoe, N. J.

1,806,380. **Tire Valve Pressure Gage.** F. G. Arnold, New York, N. Y.

1,806,569. **Motor Mounting.** B. H. Anibal, Pontiac, assignor to General Motors Corp., Detroit, both in Mich.

Dominion of Canada

310,755. **Crest Making Fabric.** J. C. Comyn, Toronto, Ont.

310,767. **Vehicle Springs Pivotal Connection.** H. C. Harris, Akron, O., U. S. A.

310,775. **Foot Arch Support.** C. R. La Salle, Montreal, P. Q.

310,847. **Resistant Material.** Canadian Industries, Ltd., Montreal, P. Q., assignee of F. A. McDermott, Claymont, and F. J. Funk, Wilmington, both in Del., U. S. A.

310,977. **Antiglare Shield.** E. D. Crump, Edmonton, Alberta.

310,986. **Pump.** H. H. Haight, Milwaukee, Wis., U. S. A.

310,990. **Fountain Pen Cap Gum Moistener.** W. H. R. Hutchins, Tranquille, B. C.

311,007. **Garment Elastic Ring.** F. Pohl, Berlin S.W.68, Germany.

311,140. **Inner Tube Patch.** Western States Mfg. Co., Inc., assignee of C. E. Dunlap, both of Sioux City, Iowa, U. S. A.

311,182. **Waterproof Shoe.** A. Csont, Coraopolis, Pa., U. S. A.

311,461. **Multiple Leaf Spring.** J. W. Watson, Wayne, Pa., U. S. A.

311,512. **Boat Fender.** Dunlop Tire & Rubber Goods Co., Ltd., assignee of D. E. Beynon, both of Toronto, Ont.

311,639. **Resilient Tire.** J. V. Martin, Garden City, N. Y., U. S. A.

311,680. **Armored Cable.** Cables, Conduits & Fittings, Ltd., assignee of V N. Longtin, both of St. Johns, P. Q.

311,706 and 311,707. **Vehicle Cushion Connection.** International Motor Co.,

assignee of A. H. Leipert, both of New York, N. Y., U. S. A.

311,743. **Tire Pressure Gage.** A. Schrader's Son, Inc., assignee of J. Wahl, both of New York, N. Y., U. S. A.

311,744. **Tire Pressure Gage.** A. Schrader's Son, Inc., assignee of A. Watters, both of New York, N. Y., U. S. A.

311,747. **Transfer Press.** Traung Co., a copartnership consisting of L. and C. F. Traung, L. H. Jackson, H. W. Johnston, F. T. Sheedy, and H. T. Gardner, assignee of F. T. Sheedy, H. C. Wood, and L. Traung, co-inventors, all of San Francisco, Calif., U. S. A.

United Kingdom

342,384. **Ear Protector.** E. Köhl, Cannstatt, Germany.

342,462. **Roller.** R. Wheatley, Midlothian, and Victoria Rubber Co., Ltd., Edinburgh.

342,871. **Printing Machine.** C. F. Dausmann, Oak Park, Ill., U. S. A.

343,196. **Sock Suspender.** L. Turner & Co., Ltd., and C. Robertson, both of Leicester.

343,224. **Top Boot.** C. W. Randall & Co., Ltd., London. (Hood Rubber Co., Watertown, Mass., U. S. A.)

343,242. **Chewing Preparation.** H. W. Cox and D. H. Moore, both of Weston-super-Mare.

343,259. **Saddle.** E. V. Palmer, Birmingham.

343,336. **Lifesaving Suit.** A. Belloni, Portovenere, Italy.

343,350. **Gramophone Attachment.** J. H. T. Roberts, London.

343,422. **Tire Pressure Gage.** A. Schrader's Son, Inc., Brooklyn, N. Y., assignee of J. Wahl, Rosedale, Queens, N. Y., both in the U. S. A.

343,684. **Reservoir Pen.** M. V. Timtiman, Manila, Philippine Islands.

343,737. **Siphon Bottle.** F. C. Peacock, Hove, Sussex.

343,774. **Manicuring Appliance.** G. G. Culver, Philadelphia, Pa., U. S. A.

343,816. **Vehicle Clock Mounting.** F. Bolanz, Weil-on-Rhine, Germany.

343,995. **Hair Brush.** D. Simpson, Westcliff-on-Sea.

344,002. **Truss.** E. C. V. Fuller, Gravesend, Kent.

344,185. **Fountain Pen.** A. M. Spain, Ringlestone, Maidstone.

344,215. **Collapsible Tube Closure.** C. Fowler, Geneva, Switzerland.

344,238. **Liquid Aerating Device.** F. P. Egeberg, Oslo, Norway, assignee of W. T. MacDonald, Douglas, Ariz., U. S. A.

344,338. **Artificial Limb Joint.** C. Desoutter and Desoutter Bros., Ltd., both of London.

344,441. **Aircraft Shock Absorber.** India Rubber, Gutta Percha & Telegraph Works Co., Ltd., and W. L. Avery, of India Rubber, Gutta Percha & Telegraph Works, Silvertown, both in London.

344,468. **Flexible Pipe.** New York Rubber Corp., New York, N. Y., U. S. A.

344,557. **Road Vehicle Suspension.** Soc. Anon. Des Anciens Etablissements L. Laisne, assignee of L. R. E. Laisne, both of Nantes, France.

344,596. **Horseshoe.** J. E. Pollak, London. (Imperator Hestesko Aktieselskabet, Tönsberg, Norway.)

344,619. **Squeegee.** J. G. Garratt, Brighton.

344,709. **Galvanic Battery.** H. Wehrlin, Berlin, Germany.

344,825. **Cable.** Electrical Research Products, Inc., New York, assignee of J. J. Gilbert, Douglaston, both in N. Y., U. S. A.

344,838. **Reenforced Concrete Pipe.** L. Billé, Nogent-on-Marne, France.

345,066. **Index Tab.** Morland & Impey, Ltd., and A. G. Rendall, both of Birmingham.

345,116. **Plug Coupling.** British Thomson-Houston Co., Ltd., London, assignee of N. H. Watts, Oakland, Calif., U. S. A.

345,273. **Pile Fabric.** W. Holt, Lancashire.

Germany

524,517. **Link Driving Belt.** R. Boila, C. and H. Bach, all of Medias, Roumania. Represented by B. Bloch, Berlin 4.

524,543. **Cellular Tube.** M. Muller, Regensburg.

525,613. **Inner Tube.** F. Boden, Braunschweig.

526,154. **Stopper.** P. Weickel, Koblenz.

Designs

1,162,550. **Overall.** Firma M. Steinberg, Köln-Braunsfeld.

1,167,486. **Sponge Rubber Ball.** Continental Gummiwerke A.G., Hannover.

1,167,587. **Pessary.** H. G. A. Oelmann, Hamburg.

1,167,636. **Nonskid Tire.** Continental Gummiwerke, A.G., Hannover.

1,167,729. **Foot Bandage.** M. G. Muller & Pfaff, Plauen i.V.

1,167,866. **Block Belt.** L. Wallfisch, Hirschberg i. Schles.

1,168,119. **Overshoe.** Hanauer Gummischuhfabrik Westheimer & Co., Hanau a.M.

1,168,544. **Tire Indicator.** Continental Gummiwerke A.G., Hannover.

1,168,919. **Toy Ball.** Ungarische Gummiwarenfabriks A.G., Budapest. Represented by J. Tenenbaum and H. Heimann, both of Berlin S.W.68.

1,169,617. **Spraying Figure.** J. Lux, Gorlitz.

1,170,051. **Bathing Slipper.** S. Saul, Aachen.

1,170,235. **Ping-Pong Racket.** Continental Gummiwerke A.G., Hannover.

1,170,247. **Tennis Racket Cover.** C. Muller Gummiwarenfabrik A.G., Berlin-Weissensee.

1,170,396. **Hand Lamp.** E. Rademacher, Dusseldorf.

1,170,527. **Expander.** H. Strein, Bad Kreuznach.

1,170,555. **Sport Shoe.** Hanauer Gummischuhfabrik Westheimer & Co., Hanau a.M.

1,170,659. **Simulated Linoleum.** Ungarische Gummiwarenfabriks A.G., Budapest, Hungary. Represented by J. Reitstotter, Berlin-Steglitz.

1,170,666. **Knitted Rubber Stocking.** O. Frankhanel, Triebes i.Th.

1,170,733. **Heel.** F. Rink and J. Lutobarsky, both of Dusseldorf.

1,170,748. **Elastic Inserts.** A. G. Metzeler & Co., Munich.

1,170,936. **Inflatable Mattress.** Mundenhildesheimer Gummiwarenfabriken Gebr. Wetzell A.G., Hildesheim.

1,171,148. **Overshoe.** S. Blumenthal, Berlin-Charlottenburg.

1,171,611. **Cord.** F. Schwelm, Krefeld.

1,171,729. **Overshoe.** Romika Schuhfabrik A.G., Köln-Nippes.

Trade Marks

United States

282,643. Portion of a belt with a diagonal red stripe thereon. Belts and belting. B. F. Goodrich Co., New York, N. Y.

282,670. **Philburgin.** Rubber substitute. P. Burger, Berlin, Germany.

282,677. **Hy-Lindy.** Golf ball. E. M. Shaner, Lynchburg, Va.

282,700. **Covulc.** Golf putting greens. Hitchcock Co., Inc., Boston, Mass.

282,719. **Etam.** Sheets and bands for repairing. Sternberg, Haberland, Liebert & Co., Berlin, Germany.

282,814. **Sunburst.** Rubber bands. United Drug Co., Boston, Mass.

282,839. Representation of a box and thereon the words: **"Harwood's Aspirin Gum, 'Look for the Blue Tablet.'"** Chewing gum. J. de Vautibault, doing business as Aspirin Gum Sales Co., New York, N. Y.

282,882. **Baby Ruth Real Pepsin Gum.** Chewing gum. Curtiss Candy Co., Chicago, Ill.

282,890. Bordered circle containing the words: **"R. T. Vanderbilt Co. N. Y. American Products. Telloy."** Toughener. R. T. Vanderbilt Co., Inc., New York, N. Y.

282,894. **Champion.** Golf balls. Arlington Rubber Co., Dorchester, Mass.

282,905. Seal with representation of a Minute Man and the words: **"Spirit of '76, Patriot Balloon for Heroic Service."** Tires and tubes. B. F. Goodrich Co., New York, N. Y.

282,966. **"Ball-For-All."** Balls. Eno Rubber Corp., Los Angeles, Calif.

283,020. **Turfo.** Matting. J. C. Flanagan, Pittsburgh, Pa.

283,036. **Naugahyde.** Rubberized fabric. United States Rubber Co., New York, N. Y.

283,160. Representation of a section of a hose. Hose. Eureka Fire Hose Mfg. Co., New York, N. Y.

283,172. **The Reklaw Ball.** Golf balls. Edwards & Walker Co., Portland, Me.

283,174. **Airweave DeLuxe.** Automobile cushions and coverings. D. L. Irvin, New York, N. Y.

283,223. Two circles containing the words: **"Dollar Slippers,"** and a green flag with a dollar sign thereon. Footwear. C. H. Daniels, Boston, Mass.

283,232. **Taylord Arch.** Footwear. Lord & Taylor, New York, N. Y.

283,264. **Cantilever Cubs.** Footwear. Ground Gripper Shoe Co., Inc., New York, N. Y.

283,266. **Polar Grip.** Tires. Firestone Tire & Rubber Co., Akron, O.

Dominion of Canada

51,989. **Kontak.** Brake lining. Russell Mfg. Co., Middletown, Conn., U. S. A.

52,036. **Rusco-Ace.** Belting and brake

lining. Russell Mfg. Co., Middletown, Conn., U. S. A.

52,037. **A C E.** Belting and brake lining. Russell Mfg. Co., Middletown, Conn., U. S. A.

52,114. **Korbasite.** Sealing and preservative compound for inner tubes. H. French, Toronto.

United Kingdom

B506,902. **DuPont Ventube.** Tubing. E. I. du Pont de Nemours & Co., Wilmington, Del., U. S. A.

510,692. **British Standard.** Electric insulators. British Engineering Standards Assn., Westminster, London, S.W.1.

514,858. **Necono.** Printing plates. Nickeloid Electrotype Co., Ltd., London, E.C.4.

514,859. **Econo.** Printing plates. Nickeloid Electrotype Co., Ltd., London, E.C.4.

519,329. A shield bearing the representation of a horseman and the word: **"Revere."** Thread. Dominion Rubber Co., Ltd., London, E.C.4.

520,408. **Turf-Tex.** Sheets. Carnie-Goudie Mfg. Co., Kansas City, Mo., U. S. A.

B521,001. Shield bearing the letter: "M," and below, the word: **"Marathon."** Heels. Goodyear Tyre & Rubber Co., (Great Britain) Ltd., Wolverhampton, Staffordshire.

521,269. **Rublea.** Soles. J. Shortland, Ltd., Irthlingborough.

521,654. **Cascade.** Goods included in Class 40. Redfern's Rubber Works, Ltd., Hyde, near Manchester.

Designs

United States

84,120 and 84,121. **Toy.** Term 7 years. L. Turchanyi, Sashalom, assignor to Hungarian Rubber Goods Factory, Ltd., both of Budapest, Hungary.

Dominion of Canada

9,141, 9,142, and 9,143. **Overshoe.** Dominion Rubber Co., Ltd., Montreal, P. Q.

9,174. **Combination gaiter and overshoe.** A. Lambert, Ltd., Montreal, P. Q.

Labels

United States

39,099. **General Health Nipples.** Nipples. General Health Corp., Philadelphia, Pa.

39,188. **Vulcanizing Hot Patch Cement for Torn Auto Tops.** Cement. C. J. Ingersoll, Seattle, Wash.

Prints

United States

13,198. **Win Nation-Wide Approval.** Tires. Fisk Tire Co., Inc., Chicopee Falls, Mass.

13,199. **Air-Flight Principle.** Tires. Fisk Tire Co., Inc., Chicopee Falls, Mass.

Hedging on the Exchange

An important purpose of a futures contract market is to provide facilities for those who produce, handle, or manufacture basic commodities, to hedge their products, commitments, or inventory stocks. Hedging has been described as price insurance and the value of a hedge is in the protection it affords against fluctuation.

In the rubber industry as well as in most manufacturing industries where crude products are used, considerable time may elapse between the purchase of the raw product and the sale and delivery of the manufactured article. During this period there are apt to be fluctuations in price of the crude product, which may result in loss to some at least, of the parties through whose hands it passes. These parties may protect themselves against such loss by hedging their commitments on the Rubber Exchange.

A dealer or importer may receive cable offers of rubber from producers or dealers in the Far East at a certain price which must be accepted promptly. Market conditions being favorable, he can immediately sell this rubber on the Exchange at a profit and accept the cable offer. Before this rubber arrives in New York, he may be able to sell same to a better advantage in the open market for delivery on arrival. He will then immediately buy in his Exchange contract. If he is unable to sell to a better advantage in the open market, he will make a delivery on the Exchange in the month for which the rubber was sold.

A dealer may find himself carrying a heavy stock of rubber in the face of a declining market. He can then protect himself against loss on this stock by selling contracts on the Exchange for future delivery. He may find it to his advantage to sell some or all of this rubber on the outside market before the delivery months are reached, in which case he will close out his Exchange contracts; but if he does not sell in the outside market, he will make his deliveries on the Exchange. In either case if the price has declined the dealer has protected himself against loss.

A dealer may enter into a contract with a factory to deliver certain grades of rubber over a period of any six to twelve months, the grade and the price being fixed at the time of sale. To protect himself the dealer can immediately buy futures contracts on the Exchange and he will then negotiate in the outside market for the physical rubber of the grade required for deliveries in the specified months. As he buys his rubber for delivery he will close out the corresponding Exchange contracts, and if the price has advanced, the increase which he pays for physical rubber will be offset by the profit on his Exchange contracts. If the price has declined, his profit on his physical transaction will offset the loss on his Exchange contracts. In either case, his profit on his original transaction with the factory is assured.

A manufacturer of rubber goods may contract for his potential requirements over a period of say three to six months, deliveries to be made monthly, and the price to be that prevailing at the time the contract is made. He may not have contracted for the sale of all his manufactured products at a price based on the cost of his contracted rubber. To insure himself against price fluctuations he can sell futures contracts on the Rubber Exchange totaling the amount of his contracts for actuals, apportioning them in the active trading months approximating the months in which he is to receive deliveries of the actuals; and as he takes in the physical rubber and consumes it he will buy in corresponding contracts on the Exchange. Thus a profit or a loss on the Exchange contracts will offset any loss or profit in the actuals.

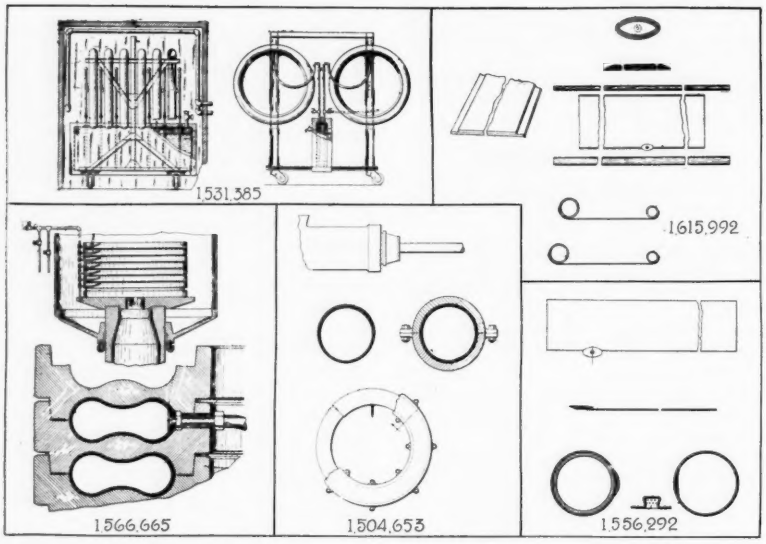
A manufacturer may find himself carrying a considerable amount of crude rubber in his inventory and this stock can be protected in a similar manner. It can readily be seen that in the face of a declining market, hedging is a most essential protection against loss.

A manufacturer may make contracts for sales of his products based on the current price of rubber. To cover his requirements, he may purchase futures contracts on the Exchange for deliveries approximating the months in which he may require the actual rubber, and he can then buy his rubber of the grade he requires in the open market from time to time at the then prevailing price, and as he takes this rubber in and consumes it, he sells out contracts on the Exchange for corresponding quantities. If he is obliged to pay a higher price for his actuals than for his futures on the Exchange, this increase is offset by the profit he makes when he sells out his Exchange contracts. By this procedure he has protected his profit on the goods which he had sold under contract, and relieved himself of the chance of loss with its consequent worry.

Another important use of the futures market not only in rubber but in any imperishable commodity is the accumulation of supplies covering requirements for a long period of time. In other words if it is felt that the current price is reasonably low, instead of going into the market and buying large supplies of actual rubber, which would have to be stored and insured, the equivalent amounts can be bought on the Exchange and as the actual rubber is needed for manufacture, it can be bought in the open market at the then existing price and an equivalent amount of futures contracts liquidated. If rubber had actually advanced, the profit on these futures contracts will offset the increase in the cost of the actual rubber involved in the transaction.

In placing hedges the inactive months should be avoided and contracts should be bought in the active months following the months in which the actual rubber is to be taken in so that in closing out the Exchange contracts the hedger has a wider market and is not likely to encounter a squeeze in the current month when his rubber is delivered.

Making Inner Tubes



THE following abstracts of United States patents relating to the manufacture of inner tubes are continued from INDIA RUBBER WORLD, June 1, 1931:

86. Roberts, 1,503,667. Aug. 5, 1924. The method of making inner tubes comprises forming the tube as a complete annulus from two sheets of rubber joined together by peripheral seams, applying a patch to the exterior of such annular tube, distorting the wall of the tube inwardly in the region of the patch to provide a depression snugly occupied by the patch, perforating the patch and the tubular wall behind it, and inserting a nipple through such perforation.

87. Taylor, 1,504,653. Aug. 12, 1924. The method comprises forming a straight tube having the wall thickness on one side sufficiently greater than the wall thickness directly opposite to produce a tube of substantially even wall thickness when inflated into annular form, joining the ends of the tube to form an annulus with the thicker part of the tube wall forming the outside of the annulus, expanding the annular tube so formed into an annular mold, and vulcanizing the tube. (See group illustration.)

88. Glickert, 1,521,879. Jan. 6, 1925. Two sheets of stock are separately rolled around a pole and their margins lapped so as to define two spaced-apart seams, ribs, or thickened zones, between which, a valve stem (and preferably also a reenforcing valve base) may be located so that when the tube is cured and finished the valve stem projects radially inward with sufficient exactness.

89. Laursen, 1,530,128. Mar. 17, 1925. Making a rubber tube with a tapered end consists in applying graduated pressure to the end of the tube and maintaining it during vulcanization, whereby the end will be molded in tapered form.

90. Gammeter, 1,531,385. Mar. 31, 1925. Tubes are made by forming a straight, tubular length of stock and vulcanizing it in curved form with its outer face exposed in a fluid medium while maintaining within it a fluid pressure so related to that on its exterior as to prevent change of form during vulcanization. (See group illustration.)

91. Rusha, 1,541,119. June 9, 1925. Valve holes are formed in tubes by placing an apertured reenforcing pad over a ply of rubber, forcing the rubber ply through the aperture of the pad, applying the tube stock over the aperture and vulcanizing.

92. Maynard, 1,544,255. June 30, 1925. Making non-porous tubes consists in extruding the hot stock in tubular form, cooling the tube promptly to prevent the formation of sulphur crystals, mounting the tube on a mandrel, and vulcanizing it with its surface in contact with a vulcanizing fluid.

93. Grennor, Jr., 1,548,361. Aug. 4, 1925. The method of splicing rubber tubes consists in supporting a small central length of the tubes leaving the ends of each tube freely suspended, continuously moving the central portion of the tube to control the sequence and frequency of the operations to be performed, buffing and cementing the ends of the tubes while temporarily arresting the ends but not the middle of the tubes, drying the cement while the tubes are still so suspended, and presenting the tubes successively for splicing.

94. Buckbee, 1,549,961. Aug. 18, 1925. Tube stock is vulcanized by wrapping it about a hollow mandrel, next placing clamping members on the ends of the mandrel and around the ends of the material, the clamping members being formed with conical shaped surfaces for pinching the ends of the rubber material, then exhausting the air from the interior of the mandrel for causing the clamps to pinch and close the ends of the mandrel.

95. McLeroth, 1,550,653. Aug. 18, 1925. A plurality of raw rubber sections are combined to form an air tube having a series of compartments, the inner periphery of the air tube having apertures opening into the compartments; building up, also from raw rubber, and as a separate integer, a tubular patch adapted to close the apertures; mounting valveless feed tubes of partially vulcanized rubber on the tubular patch; uniting the tubular patch with the air tube and causing the valveless feed tubes to project through the apertures, one into each compartment; and vulcanizing the air tube, the tubular patch and valveless feed tubes simultaneously and as a single unit, and without the use of solid cores.

96. O'Connor, 1,551,046. Aug. 25, 1925. A method of making annular tubes in which they are formed straight, stretched upon and supported by a conical surface, and subjected to a vulcanizing heat while so supported.

97. Palmer, 1,551,264. Aug. 25, 1925. A sheet of tube forming material is caused to travel on a movable and flexible support, a mandrel is placed on the sheet at an angle to the path of travel of the support, the mandrel being confined against lateral movement while permitting rotary and longitudinal movement.

98. McLeroth, 1,551,999. Sept. 1, 1925. Valveless partially-vulcanized rubber feed tubes are secured to a strip of raw rubber, the strip formed into a tube by uniting its lateral margins so that the valveless feed tubes project outwardly, introverting the end of the tube, securing a disk of raw rubber to the tube where it bends over the ring, further introverting the tube and securing another disk of raw rubber, and so on in succession, the disks dividing the tube into a series of compartments and being secured thereto intermediately of the valveless feed tubes, cutting off a predetermined length of the tube, uniting its ends to form an annulus and vulcanizing the tube.

99. Kline, 1,555,587. Sept. 29, 1925. The method of forming inner tubes consists in forming the tube about a mandrel having depressions in part of its surface, applying a surplus of stock to a part of the mandrel, applying pressure to the tube to force a part of the stock into the depressions, vulcanizing and reversing the formed tube.

100. Marquette, 1,556,292. Oct. 6, 1925. A vulcanizing stud for use in tube making having a hollow body portion closed at one end and holes through the sides of the body portion. (See group illustration.)

101. Fleischli, 1,557,680. Oct. 20, 1925. A cuffing machine including a standard, a cylinder on the standard, a plurality of fingers pivoted on the cylinder to swing away from and towards the axis of the

cylinder, the fingers being curved inwardly at the extremities, bluntly pointed conical ends on the fingers, and spring means holding the fingers normally closed toward the axis, a rod extending through the cylinder axially thereof, a disk on the end of the rod having its edges in contact with the fingers on their inner sides and movable forwardly to expand the set of fingers, and means to move the rod.

102. Subers, 1,566,512. Dec. 22, 1925. A flexible resilient tube is formed by winding four series of bands of calendered rubber free of fabric about a mandrel, the bands of the first and third series being wound in one direction and the bands of the second and fourth series being wound in the opposite direction, the bands of each series covering one half of the mandrel and thus forming a layer two bands thick at all points, and then curing the tube.

103. Frost, 1,566,665. Dec. 22, 1925. A rubber tube is made by the homogeneous incorporation of the opposite edges of two vacuum-stretched mold-shaped annular pieces of rubber one into the other to form an endless tube of a smooth and unbroken exterior and vulcanizing the tube. (See group illustration.)

104. Fenlason, Jr., 1,568,820. Jan. 5, 1926. A method which consists in calendering the stock in the form of a continuous helical strip and assembling the strip on a revolving support, the supporting surface of which is a plane.

105. Fairchild, 1,572,276. Feb. 9, 1926. The method consists in providing a section of the tubing with a slit in one end, mounting a mandrel in the other end of the section, bringing the ends together in lapped relation, kneading together the lapped portions of the tube so that they are united by cohesion, cutting an aperture through the lapped ends of the tube using the mandrel as a base, removing the mandrel through the slit, inserting a valve stem through the aperture, bringing together the edges of the slit, mounting an apertured base patch upon the tube so that the aperture surrounds the neck of the valve stem, and then kneading the tube in the vicinity of the valve stem and slit so that contacting surfaces of the wall of the tube are united by cohesion.

106. Gammeter, 1,579,300. Apr. 6, 1926. The method of making tubes comprises laying a sheet of stretchable material upon an extensible support, augmenting the adhesion between the material and support by pressing them together at their margins, extending the support to stretch the material thereon, and then rolling a mandrel on the material while stretched, to wind it upon the mandrel.

107. Bolt, 1,583,520. May 4, 1926. Vulcanizing tubes under internal pressure with the valve stem in position comprises permitting the valve stem to move outwardly as a result of the internal pressure while the rubber is softened during vulcanization, and arresting the movement of the valve stem after the base has become embedded in the rubber.

108. Stevens, 1,592,809. July 13, 1926. An apparatus for forming cuffs on inner tubes, comprising a plurality of fingers, means to expand the fingers, and air cushioning means adapted to form an air cushion between the fingers and the tube.

109. Smith, 1,594,857. Aug. 3, 1926. This apparatus for unwrapping tubes comprises a framework, means on the framework for supporting wrapped tubes on mandrels, a set of revoluble rollers to support a mandrel, and a roller extending across the apparatus adjacent the support adapted to draw the wrapping from the tubes.

110. Fairchild, 1,597,658. Aug. 24, 1926. This consists in providing a tube of unvulcanized rubber compound, uniting the ends of the tube, withdrawing the air by suction, filling the tube with steam, and then vulcanizing the tube.

111. Melvin, 1,598,383. Aug. 31, 1926. The method comprises tubing the stock to a length in excess of normal requirements, positioning the raw tube on a mandrel, turning back the ends of the tube, and subjecting it to vulcanization.

112. McRoberts, 1,601,574. Sept. 28, 1926. The apparatus comprises internal and external molding members shaped to define, when assembled, a tube molding cavity, the external molding members having secured thereto a split collar adapted to engage the internal molding members and carrying conical faces which mold the tubes at their end with an inwardly tapering surface.

113. Lowe, 1,601,759. Oct. 5, 1926. The process of producing a tire tube of ovate cross section comprises curing the tube on a mandrel to a substantially circular shape and cross section exhibiting a corrugation or dimple in one side, and afterward turning the tube inside out.

114. McCandless, 1,604,526. Oct. 26, 1926. Splicing the ends of a tube consists in applying a coat of adhesive to at least one of the surfaces to be joined, folding one end of the tube over a tubular mandrel to form a cuff-like overlap, bringing the other end of the tube into edge contact with the forward edge of the cuff-like portion, and pulling the contacting ends into the mandrel to strip the cuff portion from the exterior thereof and to overlap it with the adjacent end of the tube.

115. Stratford, 1,606,270. Nov. 9, 1926. The method consists in forming two rubber strips of semi-circular outline in cross section and having projecting lateral edges at each side, forming one of the strips into an endless band, superimposing the other upon the first so that the lateral edges contact, and simultaneously pressing together and cutting the superimposed edges of the strips to produce a tube of circular cross section.

116. Bates, 1,606,865. Nov. 16, 1926. Annular tubes are made by nesting a pair of doubled sheets, the inner sheet being prevented from having its layers mutually adhering, cutting through such folded sheets in two concentric arcs with the doubles of the sheets extending across the arcs in two regions, and joining the sheets where cut through by marginal seams.

117. Henderson, 1,608,393. Nov. 23, 1926. Producing multi-ply fabrics for tire tubes reenforced with strips of textile fabric consists in disposing the outermost and innermost layers of rubber in contact with an adjacent series of embedded fabric strips with the grain of the rubber in parallelism with the fabric strips, while the grain of an intermediate layer of rubber between opposed surfaces of two series of fabric strips is in angular relation to them.

118. Stevens, 1,612,545. Dec. 28, 1926. A machine for wrapping and loosening a tube on a mandrel having a plurality of rollers for supporting a mandrel, and mandrel gripping means on the supports, the gripping means being shiftable into and out of operative position.

119. Ellinwood, 1,613,089. Jan. 4, 1927. The method comprises forming the tube by rolling the calendered stock about a straight mandrel with the stock overlapping that portion which in the finished tube is subject to distortion an amount sufficient to substantially equalize the decrease in thickness of the tube when the latter is formed into an annulus and inflated and curing the tube while on the straight mandrel.

120. Maynard, 1,615,992. Feb. 1, 1927. The method comprises preparing a sheet of rubber of the length desired for the tube and wide enough to pass at least twice around a mandrel, placing on one longitudinal edge of the sheet a dried laminated fabric valve pad having a recess cut through certain fabric plies and opening towards what is to be the inside of the tube, rolling the sheet tightly around a mandrel with the longitudinal edge in contact with the mandrel, binding the ends of the tube to the mandrel, vulcanizing the tube on the mandrel under external pressure furnished solely by a fluid under sufficient pressure to obliterate the inside longitudinal seam. (See group illustration.)

121. Huetter, 1,616,958. Feb. 8, 1927. The invention contemplates an exterior form and a mandrel of flexible, but inextensible material preferably sheet metal expanded by fluid pressure to subject the interposed tubular body to internal pressure. This internal pressure may be achieved by the use of super-heated steam thereby affording vulcanizing heat as well as pressure. For tube splicing, both matrix and mandrel are longitudinally slotted, the mandrel being of tubular form with hollow walls terminating in spaced relations to afford the access slot through which the endless tube may be removed after splicing the ends.

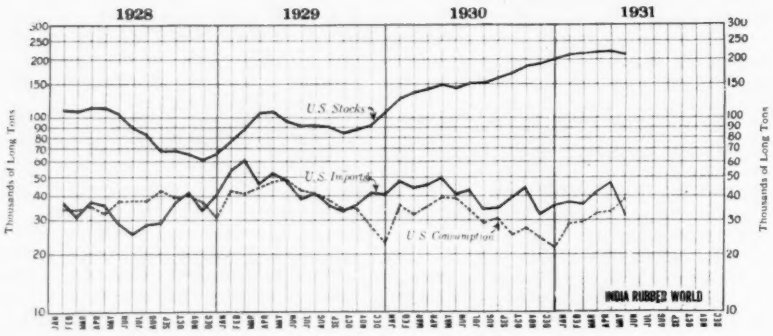
122. Hastings, 1,619,119. Mar. 1, 1927. The process consists in covering the overlapped transverse edges of the vulcanized inner joint with an annularly extending strip of rubber and cementing the latter to the tube, then introducing the tube into a circumscribed area and inflating and finally applying a hot metal surface enclosed within the area to the strip throughout its complete length, at one and the same time, and thereby merging the strip with the wall of the tube at the joint portion.

123. Hennessy, 1,623,183. Apr. 5, 1927. In this method of vulcanizing tubes in open heat the splice is placed directly above the mandrel so that when the rubber softens the edge of the splice will merge into the walls of the tube to form a smooth surface.

124. Fenton, 1,624,725. Apr. 12, 1927. The method consists in supporting the inflated tube so that the wall is free to adjust itself and with the valve stem maintained in the median plane of the tube, and then first heating the tube to approximately 180° F. in a dry heat and subsequently allowing it to cool while so held.

(To Be Continued)

Imports, Consumption, and Stocks

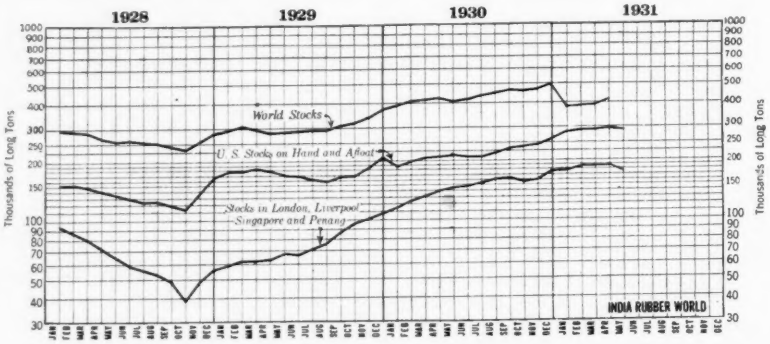


United States Stocks, Imports, and Consumption

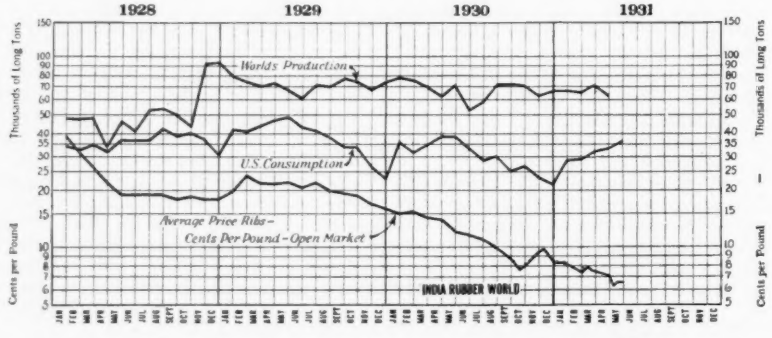
CONSUMPTION of crude rubber in the United States for May was the highest for any month since May a year ago and is estimated to be 37,817 long tons, an increase of 13.5 per cent over the April consumption.

Imports of crude rubber for May were 31,720 long tons, the lowest since August, 1928, and compares with 46,648 long tons for April and 40,745 long tons for May, 1930.

For the first time since September, 1929, stocks on hand in the United States showed a decrease from the previous month's figure. Total domestic stocks of crude rubber on hand and in transit overland on May 31 are estimated at 220,799 long tons, a decrease of 3.3 per cent under April, although 56.2 per cent over May, 1930.



World, United States, London, Liverpool, Singapore and Penang Stocks



World's Production, U. S. Consumption, and Price of Ribs

Balata shipments out of Brazil, exclusive of transshipments from Iquitos for ten months of 1930 amounted to 1,671,305 kilos, or about 4,130,000 pounds. It, therefore, appears that total Brazilian exports for 1930 were in excess of those for 1929.

The total exports from Panama during the first half of 1930 amounted to 90,242 kilos, against 72,000 kilos in the first half of 1929.

In 1928 the balata exports from Colombia were 124,506 kilos, perillo 143,698 kilos, and nisperillo 4,243 kilos. Complete statistics for Colombia for 1929 are not available, but the exports of balata alone are officially reported as 117,611 kilos.

The balata exports from Peru during the first eight months of 1930 amounted to 440,956 kilos, against 541,486 in the first eight months of 1929.

The exports of balata from British Guiana in 1930 totaled 995,459 pounds, against 599,897 pounds in 1929.

The following tabulations show stocks of crude rubber in London and Liverpool as of the dates named.

London Stocks		Liverpool Stocks	
Week Ended	Tons	Week Ended	Tons
May 30	85,332	May 30	53,668
June 6	84,915	June 6	54,258
June 13	83,743	June 13	54,812
June 20	82,919	June 20	54,422

United States and World Statisties of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Net Imports* Tons	U. S. Consumption Tons	U. S. Stocks on Hand† Tons	U. S. Stocks Afloat† Tons	United Kingdom Stocks†‡ Tons	Singapore and Penang Stocks, Etc.†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks U. S. A., U. K., Singapore, and Penang†‡ Tons
1925	384,837	384,644	50,985	52,421	6,328	18,840	527,600	553,300	180,850
1926	411,962	358,415	72,510	51,238	51,320	26,443	621,900	542,000	273,060
1927	431,807	372,528	100,130	47,938	66,261	25,798	607,300	593,866	298,780
1928	446,421	442,227	66,166	68,764	22,603	32,905	653,837	686,945	284,198
1929	561,454	466,475	105,138	62,389	73,253	35,548	860,404	804,820	371,425
1930	488,343	375,980	200,998	56,035	120,575	46,003	815,835	702,935	492,165
1931									
January	37,098	28,557	209,487	56,188	124,336	48,306	65,714	49,620	382,129
February	36,645	28,797	212,834	63,680	126,874	48,164	65,719	59,970	387,872
March	40,338	32,788	218,317	63,133	133,013	48,300	71,218	59,980	399,630
April	46,648	33,321	228,383	56,700	138,144	44,857	63,395	51,200	411,384
May	31,720	37,817	220,799	73,564					

*Including liquid latex, but not guayule.
†Stocks on hand the last of the month or year.
‡W. H. Rickinson & Son's 1931 figures.

Market Reviews

Crude Rubber

New York Exchange

THE hoped-for curtailment of production in the Far East has not materialized; and although prices are still too low for anyone in the industry to make money, the market has maintained a fairly steady tone throughout the month.

A few favorable developments, however, did manifest themselves. London and Liverpool stocks have declined substantially, whereas last month they increased in each of the four weeks; dealers' stocks in the Far East showed no increase, and Malayan shipments for June will take a modest drop.

The most disappointing news received was that production on large and small estates in the Far East showed an increase instead of the looked-for decrease. The native governments are making every effort to assist the rubber industry, according to consul dispatches, but the large amount of rubber planted a few years ago is now maturing and accounts, in part, for the continued large outputs.

Little hope is held that the Dutch government will produce a workable restriction scheme. Everyone concerned inclines somewhat to the belief that if rubber is allowed to work itself naturally out of its dilemma, it will be better in the long run. Statistics allow for little improvement in prices, but rubber is so low that a moderate increase may be justified.

Week ended May 30. The Whitsuntide holiday last week-end in England and the holiday here this week-end served to bring a quiet market. Very little activity was evident; prices were maintained except for one day when they fell off a few points in response to weakness on the stock market.

Estimates of May consumption in the United States were put at 37,817 tons, compared with an April consumption of 33,321 tons. Another piece of news was that the Ceylon government had reduced the export duty on crude rubber 1½ cents a pound, equivalent to a little over ½-cent in terms of United States currency. It was said that shipments which had been held up in anticipation of the reduction were only moderate.

Most of the speculation in the market centers around restriction. Some feel that the low prices now prevalent are the surest method for cutting production. Others maintain that the losses suffered by even the largest manufacturers make it urgent that action be taken to lift the market out of the doldrums.

Another important factor was pointed out by a staff correspondent of the *Journal of Commerce*. He said that the new national line-up of rubber production, prepared by the Rubber Growers' Association, at once disposes of any idea that a restriction plan could be attempted without the aid of the Dutch, as the withdrawn Stevenson plan (1922-1928) provided. Taking potential production for 1931, the sources of supply are indicated by the association as follows: British territory, 59 per cent; Dutch territory, 37 per cent; and other territory 4 per cent.

RUBBER BEAR POINTS

1. Automobile output in June will probably be less than 300,000 units, estimates the National Automobile Chamber of Commerce.
2. Production of rubber on Malayan estates under 100 acres in size increased from 11,925 tons in April to 15,399 tons in May; production on estates over 100 acres was 13,904 tons in May, compared with 17,039 tons in April.
3. Estate stocks in May totaled 21,901 tons against 21,406 tons in April.
4. Stocks on hand are estimated to be large enough for over ten months' supply; while minimum requirements need only six months' supply.
5. Malayan shipments during May were 44,281 tons, against 43,453 in April and 49,039 in May, 1930.
6. Ceylon shipments were 4,535 tons in May, compared with 3,487 in April and 5,483 in May, 1930.
7. Stocks on hand and afloat at the end of May were 294,363 tons.

RUBBER BULL POINTS

1. Stocks at London and Liverpool are declining.
2. Dealers' holdings in the Far East were 18,393 tons at the end of May, against 18,789 tons in April.
3. The cost of producing rubber on estates has declined radically. It was estimated to be 10.30 pence in 1927, 8.41 pence in 1928, and 6.28 in 1929. Well-managed estates are believed to have brought it down to almost 3 pence this year.
4. In Federated Malay States alone, upwards of 126,840 acres were untapped in March, according to government statistics.
5. Hope of restriction action by the Dutch government exists.
6. June Malaya shipments are estimated at 41,000 tons, compared with 44,200 tons in May, 43,400 in April, and 48,500 in March.
7. Indies government is allotting no more land for rice so that rubber land will have to be used.
8. Dealers' stocks in Malaya totaled 41,135 tons at the end of May, compared with 42,467 tons at the close of April, and 45,607 tons at the end of March.
9. Consumption exceeded arrivals in May for the first time since September, 1929. Consumption was 37,817 tons, arrivals only 31,720 tons.
10. April casings shipments increased 19.7 per cent over March.
11. Pneumatic casings on hand at the end of April were 23.3 per cent less than on April 30 last year.

The Rubber Exchange of New York, Inc.

DAILY MARKET FUTURES—RIBBED SMOKED SHEETS—CLEARING HOUSE PRICES—CENTS PER POUND—NO. 1 STANDARD CONTRACTS

Positions 1931	May, 1931 26	27	28	29	30*	June, 1931 1	2	3	4	5	6	8	9
May	6.55	6.33	6.35	6.35	....	....	....	....	....	....	....	....	....
June	6.55	6.35	6.38	6.38	....	6.25	6.25	6.15	6.33	6.35	6.35	6.15	6.10
July	6.55	6.46	6.48	6.48	....	6.36	6.33	6.30	6.48	6.50	6.45	6.25	6.20
Aug.	6.65	6.53	6.55	6.55	....	6.43	6.40	6.38	6.56	6.58	6.54	6.35	6.28
Sept.	6.74	6.60	6.62	6.62	....	6.50	6.47	6.45	6.65	6.67	6.63	6.46	6.37
Oct.	6.81	6.67	6.69	6.70	....	6.58	6.55	6.52	6.72	6.75	6.71	6.53	6.45
Nov.	6.86	6.74	6.76	6.78	....	6.65	6.62	6.59	6.80	6.82	6.78	6.60	6.52
Dec.	6.92	6.81	6.83	6.86	....	6.72	6.69	6.66	6.86	6.90	6.85	6.67	6.60
1932													
Jan.	6.99	6.88	6.91	6.94	....	6.79	6.76	6.74	6.94	6.99	6.92	6.75	6.67
Feb.	7.07	6.95	6.98	7.01	....	6.86	6.82	6.80	7.01	7.04	6.98	6.82	6.74
Mar.	7.15	7.02	7.05	7.08	....	6.93	6.88	6.87	7.08	7.10	7.05	6.89	6.80
Apr.	7.23	7.10	7.13	7.16	....	7.01	6.99	6.97	7.18	7.20	7.15	6.99	6.88
May	....	....	....	....	....	7.10	7.10	7.07	7.28	7.30	7.25	7.09	6.97

*Holiday.

Positions 1931	June, 1931 10	11	12	13	15	16	17	18	19	20	22	23	24
May	....	....	....	....	....	....	....	....	....	....	....	....	....
June	5.95	6.05	6.05	6.03	6.05	6.10	6.05	6.05	6.02	6.05	6.35	6.20	6.33
July	6.10	6.16	6.12	6.09	6.15	6.20	6.15	6.06	6.04	6.10	6.40	6.22	6.35
Aug.	6.20	6.25	6.21	6.21	6.24	6.29	6.22	6.15	6.13	6.22	6.50	6.32	6.45
Sept.	6.31	6.34	6.30	6.30	6.34	6.39	6.30	6.25	6.23	6.35	6.60	6.42	6.55
Oct.	6.36	6.41	6.36	6.36	6.41	6.46	6.38	6.32	6.30	6.43	6.68	6.49	6.64
Nov.	6.43	6.48	6.43	6.42	6.48	6.53	6.46	6.39	6.37	6.51	6.77	6.57	6.73
Dec.	6.50	6.56	6.50	6.48	6.55	6.60	6.54	6.47	6.45	6.60	6.85	6.65	6.83
1932													
Jan.	6.55	6.62	6.57	6.55	6.62	6.67	6.60	6.54	6.52	6.68	6.91	6.72	6.89
Feb.	6.63	6.69	6.65	6.62	6.68	6.74	6.67	6.61	6.59	6.75	6.97	6.79	6.96
Mar.	6.71	6.76	6.70	6.67	6.75	6.80	6.74	6.68	6.65	6.75	7.03	6.86	7.03
Apr.	6.80	6.86	6.80	6.77	6.84	6.88	6.84	6.77	6.74	6.90	7.13	6.96	7.12
May	6.90	6.96	6.92	6.87	6.93	7.00	6.95	6.86	6.83	7.00	7.23	7.06	7.21

Of this total, 46 per cent is European owned, 51 per cent Asiatic owned, and 3 per cent is unclassified.

Prices at the close of May 30 on No. 1 Standard contract were:

Position	High	Low	Close	Previous Close
June	...	...	6.38	6.38
July	6.55	6.53	6.48/6.53	6.48/6.55
Aug.	...	...	6.55	6.55
Sept.	...	...	6.62	6.62/6.70
Oct.	...	...	6.70	6.69
Nov.	...	...	6.78	6.76
Dec.	6.88	6.86	6.86	6.83/6.85
Jan.	...	...	6.94	6.91
Feb.	...	...	7.01	6.98
Mar.	7.15	7.07	7.08/7.09	7.05/7.08
Apr.	...	...	7.16	7.13
Spot	...	...	6.50	6.40

Week ended June 6. The disappointingly large shipments from Malaya sent the market off on Monday, but this loss was recovered in the middle of the week when the strength in the stock market lent a firmer tone to the rubber market.

Of the total of 44,281 tons exported by Malaya last month, according to a cable to the Rubber Exchange of New York, 31,014 tons were destined for United States ports, as compared with 29,021 tons shipped to this country in April and 33,010 tons during May, 1930.

Smaller quantities were exported during the month to the United Kingdom and to Japan; large totals were reported to all other countries. Malaya also imports rubber from other territories, chiefly Dutch colonial, for transshipment. Such imports amounted to 10,479 tons during May compared with 9,977 tons in April.

Ceylon shipments of 4,535 tons in May compared with 3,487 tons shipped in April. These figures clearly show how difficult it is to predict what the native producers will do. They are one of the most serious problems which must be considered in any restriction plans.

J. G. Hay, retiring chairman of the Rubber Growers' Association, recently stated that "unless and until we receive authoritative and unqualified assurances (1) that the Dutch Government is prepared to consider legislation for the regulation of output, (2) that they are willing and able effectively to control native production, we can have no confident belief that our negotiations can reach a successful conclusion."

In a bulletin of the Department of Commerce is a report from Zorn & Leigh-Hunt, which says: "In the case of some 70 rubber estates, distributed amongst the various producing districts, whose outputs for April have just been published, a decline of 12 per cent is shown against April, 1930, the totals being 4,600,000 pounds against 5,200,000 pounds."

These totals are probably for European-owned estates. Because as Mr. Hay said further, "The Asiatic owner tapper who has no other means of subsistence will go on tapping so long as he gets anything for his output, and will be—and in fact is—stimulated to more severe tapping with each fall in the price."

Prices at the close of June 6 on No. 1 Standard contract were:

Position	High	Low	Close	Previous Close
June	...	...	6.35	6.35
July	...	...	6.45	6.50
Aug.	...	...	6.54	6.58
Sept.	...	...	6.63	6.67
Oct.	...	...	6.71	6.75
Nov.	...	...	6.78	6.82
Dec.	...	...	6.85/6.89	6.90
Jan.	...	...	6.92	6.99
Feb.	...	...	6.98	7.04
Mar.	...	...	7.05/7.09	7.10
Apr.	...	...	7.15	7.20
May	...	...	7.25	7.30
Spot	...	...	6.38	6.43

Week ended June 13. Prices broke through 6 cents on Wednesday because of freer and cheaper c. i. f. offerings, slow demand, and reports that London companies were in financial difficulties. Prices did go over 6 cents again, but losses for the week totaled 30 points.

A cable received on Thursday in reference to restriction said that the Dutch committee had virtually completed the quota plan, which is understood to fix the maximum native production at 90,000 tons and estate production at 75 per cent of the 1929 total.

Automobile production went through its usual sharp decline during the first week of June, the *Times'* index standing at 72.3 for the week of June 6, against 75.3 for the week ended May 30 and 100.5 for the week ended June 7, 1930.

A total of 263,000 is indicated for new passenger car registrations during April, compared with 199,100 for March and 357,065 for April, 1930.

A decrease of 900 tons is estimated at London and Liverpool for the week. Imports into the United Kingdom during May were 9,433 tons, against 12,204 tons in April.

Dealers' stocks in Malaya totaled 41,135 tons at the end of May, compared with 42,456 tons at the close of April and 45,607 tons at the end of March, said a cable to the Rubber Exchange.

The unsatisfactory conditions in the tire field, where a good many contracts must still be filled at last year's prices, were the subject of a conference between tire manufacturers' sales representatives and bankers interested in the industry. As a result of this conference it is expected that a good many of the harmful trade practices will be revised. Manufacturers with retail outlets, and independent dealers are cooperating in an effort to rehabilitate the market and to compete successfully with the company-controlled chain store which sells tires on a price basis.

Prices at the close of June 13 on No. 1 Standard contract were:

Position	High	Low	Close	Previous Close
June	...	...	6.03	6.05
July	...	...	6.09/6.11	6.12/6.14
Aug.	...	...	6.21	6.21
Sept.	6.30	6.30	6.30/6.32	6.30/6.32
Oct.	...	...	6.36	6.36
Nov.	...	...	6.42	6.43
Dec.	6.50	6.50	6.48	6.50
Jan.	...	...	6.55	6.57
Feb.	...	...	6.62	6.65
Mar.	6.68	6.66	6.67/6.70	6.70
Apr.	...	...	6.77	6.80
May	...	...	6.87/6.90	6.92
Spot	...	...	6.06	6.06

RUBBER EXCHANGE ACTIVITIES

Week Ended	Transactions: Contracts Sold: Number	Tons	Transferable Notices	Week-End Tone
May 30	281	702.5	62	Dull
June 6	362	905.0	0	Idle
June 13	582	1,455.0	2	Dull
June 20	272	680.0	21	Firm
Totals	1,497	3,742.5	85*	

*Actual deliveries of rubber.

Week ended June 20. Prices on the Rubber Exchange have remained almost stationary during the week. Fluctuations hardly exceeded a range of about 5 points, and at the end of the week prices were about where they were at the beginning.

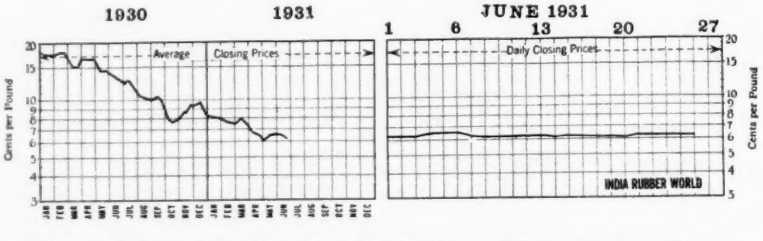
An estimate was given as to the exports from Malaya for the month, and they were placed at about 41,000 tons, compared with a gross of 44,200 in May, 43,400 tons in April, and 48,500 tons in March.

Production of rubber on Malayan estates under 100 acres in size, largely native increased from 11,925 tons in April to 15,399 tons in May. Production on estates over 100 acres in size also increased, amounting to 18,904 tons in May, compared with 17,039 tons in April.

Estate stocks in May totaled 21,901 tons, against 21,406 in April; while dealers' holdings amounted to 18,393 tons, against 18,789 in April, compared with 51,393 tons last year in May.

A cable from London stated that the formation of a rubber association representing an annual production of 10,000,000 metric pounds has been formed at The Hague for joint action.

The Malayan report was decidedly bearish, but sellers did not appear in the market. The continued large production leaves no hope for a recovery in the near future, and it is felt that traders are dropping out of the market and switching to other markets where the price does not seem to be so certain for such a long period.



New York Outside Market—Spot Closing Prices Ribbed Smoked Sheets

New York Outside Market—Spot Closing Rubber Prices—Cents Per Pound

	May, 1931						June, 1931														
	25	26	27	28	29	30*	1	2	3	4	5	6	8	9	10	11	12	13	15	16	17	18	19	20
Ribbed Smoked Sheet	6¾	6⅝	6½	6½	6½	...	6⅜	6⅜	6⅜	6½	6½	6¼	6¼	6¼	6¼	6⅛	6⅛	6⅛	6⅛	6¼	6¾	6 1/6	6 1/6	6⅛
No. 1 Thin Latex Crepe	7⅛	7	6⅞	6⅞	6⅞	...	6¾	6¾	6¾	6¾	6¾	6¾	6½	6⅜	6½	6½	6½	6½	6½	6⅝	6⅝	6⅝	6⅝	6⅝
No. 1 Thick Latex Crepe	6⅞	6¾	6⅝	6⅝	6⅝	...	6½	6½	6½	6⅝	6⅝	6⅝	6⅜	6¼	6¼	6¼	6¼	6¼	6¼	6⅜	6⅜	6¼	6¼	6¼
No. 1 Brown Crepe	6½	6⅜	6⅜	6⅜	6⅜	...	6¼	6¼	6¼	6½	6¼	6¼	6⅛	6	6	6	6	6	6	6⅛	6⅛	6	6	5⅞
No. 2 Brown Crepe	6⅛	6¼	6½	6½	6¼	...	6⅛	6⅛	6⅛	6⅛	6⅛	6¼	6	5⅞	5⅞	5⅞	5⅞	5⅞	5⅞	6	6	5⅞	5⅞	5¾
No. 2 Amber	6½	6⅜	6¼	6¼	6¼	...	6⅛	6⅛	6⅛	6⅛	6⅛	6⅛	6	6	6	6	6	6	6	6⅛	6⅛	6	6	5⅞
No. 3 Amber	6⅜	6¼	6¼	6½	6¼	...	6⅛	6⅛	6⅛	6⅛	6⅛	6	6	6	6	6	6	6	6	6	6	5⅞	5⅞	5⅞
No. 4 Amber	6¼	6¼	6⅛	6⅛	6⅛	...	6	6	6	6	6	6	5⅞	5⅞	5⅞	5⅞	5⅞	5⅞	5⅞	5⅞	5⅞	5¾	5¾	5¾
Rolled Brown	6⅛	6	6	5	6	...	5⅞	5⅞	5⅞	5⅞	5⅞	5⅞	5¾	5¾	5¾	5¾	5¾	5¾	5¾	5¾	5¾	5⅝	5⅝	5⅝

*Holiday.

In spite of the large production figures, estimates indicate that London and Liverpool stocks will decline again for the third or fourth successive week. The decline is estimated to be about 1,200 tons.

Prices at the close of June 20 on No. 1 Standard contract were:

Position	High	Low	Close	Previous Close
June	...	...	6.05	6.02
July	6.07	6.07	6.10	6.04
Aug.	...	...	6.22	6.13
Sept.	...	...	6.35	6.23
Oct.	...	...	6.43	6.30
Nov.	...	...	6.51	6.37
Dec.	6.70	6.60	6.60/6.70	6.45
Jan.	...	...	6.68	6.52
Feb.	...	...	6.75	6.59
Mar.	6.75	6.68	6.75	6.65
Apr.	...	...	6.90	6.74
May	...	...	7.00	6.83
Spot	...	...	6.15	6.06

During the week ended June 27 prices climbed 22 to 30 points on Monday, lost part of the gain on Tuesday, and regained it again on Wednesday. Tuesday's fall was undoubtedly caused by dealers who were taking profits. The only reason which could be advanced for Monday's rise was President Hoover's moratorium announcement. It had a favorable psychological effect on the market, and speculators bought. London cables were firmer too.

Production of crude rubber in the Far East does not seem to be easing up any, and no further news has been received from the meetings between the Dutch growers and the government.

Futures on June 24 closed steady on the New York Exchange for No. 1 standard contracts as follows: July, 6.35-6.39; Sept., 6.55-6.59; Dec., 6.83; Mar., 7.03. June 25 prices reflected the buoyancy of Wall Street, and closing prices were steady as follows: July, 6.50-6.52; Sept., 6.70-6.71; Dec., 6.98; Mar., 7.15.

Price Differentials

Price differentials on plantation rubber delivered against old "A" contracts during July, 1931, are: Off quality first latex crepe at one-tenth of a cent (.1 cent) per pound; good f.a.q. ribbed smoked sheets at twenty-five one-hundredths of a cent (.25 cent) per pound; ordinary f.a.q. ribbed smoked sheets at four-tenths of a cent (.4 cent) per pound.

Price differentials between the various grades of plantation rubber delivered on new "A" contracts during July, 1931, are: No. 2 crepe (thick or thin) at 10 points; No. 2 ribs at 12 points; No. 3 ribs at 28 points; No. 4 ribs at 43 points; No. 5 ribs at 68 points; limit of allowance on No. 2 crepe at 25 points; allowance on rubber delivered in bales at 13 points.

N. Y. Outside Market

Summer months are dull times for the automobile manufacturers; and since it is the opinion of some dealers that factories have at least a year's supply of rubber on hand, demand is very light in the outside market. But prices are firm. Dealers are holding on for better prices since the fractional margins on which they are now working are not worth the effort.

The cheerfulness with which the world greeted President Hoover's announcement was gladly welcomed in the rubber market. People have held back from buying for so long that it needs some impetus like the President's announcement to restore their confidence and get them in a buying frame of mind.

For many months we have talked of the long overdue replacement demand. Many threadbare tires must be running on the road. But the endurance of even the best tires is limited, and, combined with the low prices now prevailing it seems to be only a question of time before the public will regain its buying confidence.

Two large automobile manufacturers will release new models in the near future, and a manufacturer of a high-priced car is said to be stocking his dealers with cars, contrary to a strict hand-to-mouth policy in previous months.

It may be, as Roger Babson avers, that business is already on the mend and the fact is obscured by the action of the stock market. That statement we would hesitate to affirm although Mr. Babson stakes his reputation of thirty years on his prediction.

Week ended May 30. The weakness in the stock market was generally disregarded in the outside market, and prices were maintained at almost the same levels for the entire week. On Friday ribbed smoked sheets were quoted at 6½ cents for the May-June position; No. 3 amber was offered at 6⅜ cents; paras were at 8¼ for the fine up river grade; while Accra fine dropped to 8⅜ to 8½ cents. Buying was on a limited scale; purchases were made for only immediate requirements.

The Census Bureau reported that automobile production in the United States during April was 335,708 vehicles, an increase of 59,303 vehicles over the out-

New York Quotations

Following are New York outside market rubber quotations for one year ago, one month ago, and June 26, the current date

Plantation Hevea	June 25, 1930	May 26, 1931	June 26, 1931
Rubber latex (Hevea) ..gal.	$1.25 @	$0.75 @	$0.75 @
Sheet			
Ribbed, smoked, spot	.12 @.12⅛	.06¾ @	.06¼ @.06¾
July	.12 @.12⅛	.06¾ @	.06¼ @.06¾
August-September	.12¼ @.12⅜	.07 @	.06⅜ @.06⅝
October-December	.12½ @.12¾	.07¼ @	.06⅝ @.06⅞
January-March	.13 @.13¼	.07½ @	.06⅞ @.07⅛
CREPE			
No. 1 Thin latex (first latex) spot	.12½ @.12¾	.07¼ @	.06⅞ @.07
July	.12½ @.12¾	.07¼ @	.06⅞ @.07
August-September	.12¾ @.13	.07½ @	.07⅛ @.07¾
October-December	.13 @.13⅛	.07¾ @	.07⅛ @.07½
January-March	.13½ @.13¾	.08 @	.07½ @.07¾
No. 2 Amber, spot ("B" blanket)	.11½ @.11⅝	.06⅝ @	.06⅛ @.06⅜
July	.11⅝ @	.06⅝ @	.06⅛ @.06⅜
August-September	.11¾ @.11⅞	.06⅞ @	.06¼ @.06½
October-December	.12⅛ @.12¼	.07⅛ @	.06½ @.06⅝
January-March	.12½ @.12¾	.07⅜ @	.06⅝ @.06¾
No. 3 Amber, spot ("C" blanket)	.11¼ @	.06½ @	.06 @.06¼
No. 1 Brown, clean, light thin	.11½ @	.06⅝ @	.06⅛ @.06¾
No. 2 Brown, clean, thin	.11⅛ @.11¼	.06½ @	.06 @.06¼
Brown, roll	.08⅝ @.08¾	.06¼ @	.05¾ @.06
East Indian			
PONTIANAK			
Banjermasin	.08 @	.06 @	.06 @
Pressed block	.13 @	.10 @	.10 @
Sarawak	.08 @	.06 @	.06 @
South American			
PARAS			
Upriver, fine	.13¼ @	.08½ @	.08¾ @
Upriver, fine	*.18¼ @	*.11½ @	*.11¼ @
Upriver, coarse	.07 @	.05½ @	@
Upriver, coarse	*.12¾ @	*.07½ @	*.07⅝ @

South American	June 25, 1930	May 26, 1931	June 26, 1931
PARAS—*Continued*			
Islands, fine	$0.14½ @	$0.08½ @	$0.08 @
Islands, fine	*.18¼ @	*.11¼ @	*.11 @
Acre, Bolivian, fine	.13¾ @	.08¾ @	.08⅝ @
Acre, Bolivian, fine	*.18¾ @	*.11¾ @	*.11½ @
Beni, Bolivian	.14 @	.08¾ @	.08⅝ @
Madeira, fine	.13½ @	.08½ @	.08⅜ @
CAUCHO			
Upper caucho ball	.07 @	.05¼ @	@
Upper caucho ball	*.12¾ @	*.07½ @	*.07⅝ @
Lower caucho ball	.06½ @	.04¾ @	@
Manicobas			
Ceará negro heads	†.14 @	@	@
Ceará scrap	†.08 @	@	@
Manicoba, 30% guaranteed	†.16 @	†.05 @	†.05 @
Mangabiera, thin sheet	†.16 @	†.05 @	†.05 @
Guayule			
Duro, washed and dried	.16½ @	.14 @	.14 @
Ampar	.17 @	.15 @	.15 @
Gutta Percha			
Gutta Siak	.15 @	.11½ @	.10½ @
Gutta Soh	.25 @	.21 @	.19 @
Red Macassar	2.30 @2.50	1.75 @	1.75 @
Balata			
Block, Ciudad Bolivar	.41 @	.27 @	.26½ @
Colombia	.36 @	@	@
Manaos block	.44 @	.28 @	.28 @
Surinam sheet	.60 @	.54 @	.52 @
Amber	.63 @	.56 @	.54 @

*Washed and dried crepe. Shipment from Brazil.
†Nominal.

put of the previous month, and with a total of 444,024 vehicles in the corresponding month last year.

Factory sales of automobiles during the first four months of this year were 1,003,-901,' compared with 1,444,047 during the same period last year. April factory sales marked the fifth successive increase in production since November, 1930.

Malaya production figures are being awaited eagerly. It is felt that the low prices have affected native production to an extent where lower shipments can be expected. Shipments from Ceylon may be a bit larger since the government has reduced the export tax about ½-cent a pound in United States money, and some rubber may have been held back in anticipation of the reduction.

Prices at the close of May 30 were:

Spot	May 30	Month Ago	Year Ago
Crepe	6⅞	6¼	14¼
Ribs	6½	6	13⅜
Upriver fine	8¼	8¼	15½

Week ended June 6. Factory buyers did not take much rubber this week, and prices on the whole were steady. What fluctuations there were seemed to be in response to those on the stock market. At the close of the week spot ribbed smoked sheets were quoted at 6½ cents.

The slight decline in the early part of the week was due to the large Malayan shipments. The total was 43,453 tons for May, of which 31,014 tons were for the United States, compared with 29,021 in April and 33,010 in May last year. Ceylon shipments were 4,535 tons compared with 3,487 tons in April.

Proof that money can be made in the rubber business was given in the report of a large manufacturer issued during the week. Earnings on the common stock were more than twice those in the same six months of the year before; while money profits were also greater.

A note of optimism was also struck by Alvin Macauley, president of the National Automobile Chamber of Commerce, when he spoke at its annual meeting at which he declared he believed the worst of the slump was over and the industry would emerge in a strong position.

"There is little need for concern over the ability of the manufacturing division of the industry to survive the depression," he said. "Our problem is to keep our distributer and dealer organization strong enough so that they will emerge from the depression with unimpaired vitality."

He also urged that the basis on which used cars are sold be altered so that the dealer may derive a profit from such sales.

According to the bulletin of the National City Bank, "automobile production is considerably under a year ago, and was declining seasonally in the latter part of May; but the month as a whole, preliminary reports indicate, has made the best relative showing thus far in 1931, and its total output has probably been larger than April's 336,000."

Prices at the close of June 6 were:

Spot	June 6	Month Ago	Year Ago
Crepe	6¾	6⅜	13½
Ribs	6½	6⅛	13
Upriver fine	8¼	8½	15¼

Week ended June 13. Consuming interest was at a low ebb during the week, and prices eased off to close at around 6 1/16 cents bid, 6⅛ cents asked.

A rather favorable report on May consumption was issued, but it was felt to be offset by the heavy stocks afloat and by estimates that June consumption will drop off. The lower expectation in June is in line with a seasonal trend downward in automobile production.

Consumption for May was 37,817 tons, compared with arrivals of 31,720 tons. Consumption exceeded arrivals for the first time since September, 1929.

The Rubber Manufacturers' Association also reported that April shipments of pneumatic casings totaled 4,931,906 units, an increase of 19.7 per cent compared with March and only 3.1 per cent under April of last year.

April production of pneumatic casings totaled 4,944,363, an increase of 6 per cent over March and 12.4 per cent under April, 1930. Pneumatic casings on hand April 30 were reported as 10,031,410, approximately the same as on March 31, but 23.3 per cent less than on April 30 last year.

Crude rubber afloat, however, was estimated on May 31, to be 73,564 long tons for United States ports, compared with 56,700 on April 30, and 68,168 a year ago. Many traders felt that these figures indicated that the drop in Malayan stocks would not continue.

Prices at the close of June 13 were:

Spot	June 13	Month Ago	Year Ago
Crepe	6½	6⅝	12¾
Ribs	6⅛	6⅜	12⅜
Upriver fine	8¼	8½	14½

Week ended June 20. Dealers appear to have deserted the outside market although prices held steady at about 6¼ cents. The report from Malaya, which revealed large native production, was a disappointing factor. It is undoubtedly this large production, together with the large supplies on hand, which accounts for the absence of dealers. They feel that prices will not change much for a number of months to come; so there is no hurry to buy. This outlook appears to be true although restrictive action by the Dutch government may alter the picture.

Rumors have it that the committee has presented its report to the government, but details are lacking. It was learned from one cable, however, that an association representing a large production of rubber producers had been formed for joint action.

Prices at the close of June 20 were:

Spot	June 20	Month Ago	Year Ago
Crepe	6⅝	7	12⅛
Ribs	6⅛	6¼	11¾
Upriver fine	8¼	8⅜	14⅜

For the first three days of the week ended June 27, prices were up from last week and the undertone was firmer. Dealers were not inclined to shade prices and held out for asked prices rather firmly. It is believed in some quarters that dealers are not making any money at the low prices, and rather than operate on small fractions that do not cover expenses, they prefer not to sell.

(*Continued on page* 110)

Rubber Scrap

THE rubber scrap market has remained very dull the past month. Prices on 8 of the 23 grades listed below are marked down to lower levels. The remainder are quoted unchanged. Collections, while ample to supply current reclaiming demand are, however, not greatly in excess of those requirements. Excessive freight rates and zoning regulations continue to restrict collections and movement of scrap. In this respect the proposed upward revision of rates by the railways, reported on page 114 of this issue, will prove further to embarrass the trade in rubber scrap at current low prices. The following proposals for reduced rates are reported.

New England Freight Association Proposal No. 22,691 proposes to establish the following reduced rates on scrap rubber, carloads, to Naugatuck, Conn., viz.: from Bridgeport, New Haven, and Derby, 9 cents; Middletown, 10 cents; and Springdale, Conn., 10½ cents per 100 pounds.

Southwestern Freight Bureau Docket No. A-538 proposes to establish a rate of 48 cents per 100 pounds on scrap rubber, minimum weight 30,000 pounds, from Pine Top, Elsey, Crane, Pearl Mill, Quail, Springfield, Mo., and various other points, to Akron, O.

BOOTS AND SHOES. Interest in this grade is slight as indicated by the nearly complete absence of good sized orders. Colored boots and shoes, listed a month ago for the first time, are as inactive as black goods.

INNER TUBES. Labor handling costs, freight, and the small quantities procurable combine as factors reducing collections.

TIRES. The demand for this grade of scrap is good, but collections are rather light because of freight rate zoning regulations. Solid tires are off $1 to $1.50 per ton. Domestic demand is fair, but exports have fallen off.

MECHANICALS. All grades in this classification are dull. Prices are steady, unchanged, and firm.

HARD RUBBER. Stocks are moderate. The price is at the level quoted a month ago.

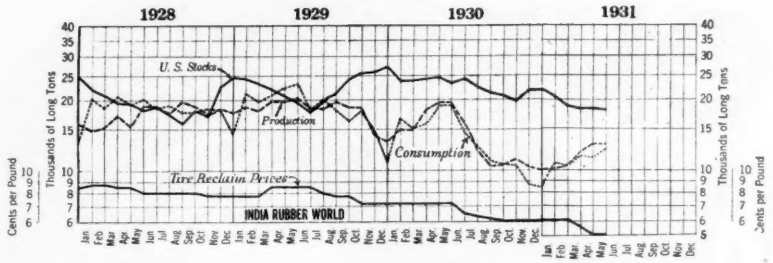
CONSUMERS' BUYING PRICES

Carload Lots

Delivered Eastern Mills
June 26, 1931

	Prices
Boots and Shoes	
Boots and shoes, black. 100 *lb.*	$1.00 @$1.125
Colored .....100 *lb.*	.625 @ .75
Untrimmed arctics...100 *lb.*	.625 @ .75
Tennis shoes and soles. 100 *lb.*	.50 @ .60
Inner Tubes	
No. 1, floating .....*lb.*	.04 @ .04⅛
No. 2, compound.....*lb.*	.015 @ .021
Red .....*lb.*	.01¾ @ .0180
Mixed tubes .....*lb.*	.01⅝ @ .01¾
Tires	
Pneumatic Standard	
Mixed auto tires with beads .....*ton*	10.00 @10.50
Beadless .....*ton*	13.50 @14.00
Auto tire carcass.....*ton*	12.00 @12.50
Black auto peelings....*ton*	20.00 @21.00
Solid	
Clean mixed truck....*ton*	26.00 @27.00
Light gravity .....*ton*	31.00 @32.00
Mechanicals	
Mixed black scrap .....*lb.*	.00⅝ @ .00¾
Hose, air brake.....*ton*	10.00 @10.50
Garden, rubber covered..*lb.*	.00¾ @ .00½
Steam and water, soft..*lb.*	.00¾ @ .00½
No. 1 red .....*lb.*	.01½ @ .01⅝
No. 2 red .....*lb.*	.01 @ .01⅛
White druggists' sundries *lb.*	.01½ @ .01¾
Mechanical .....*lb.*	.01 @ .01⅛
Hard Rubber	
No. 1 hard rubber .....*lb.*	.08¼ @ .09

Reclaimed Rubber



Production, Consumption, Stocks, and Prices of Tire Reclaim

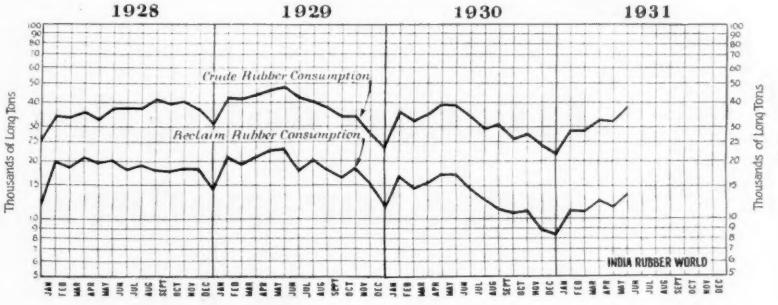
THE recognition of reclaimed rubber as a compounding ingredient of special technical merit rather than as a substitute for crude has been urged steadily by this journal for years. That this is its true status is seen by the persistence with which its ratio of consumption to that of crude is maintained notwithstanding the reduction in price of crude to reclaim levels on a pound basis equivalent to only half the price of the latter on a volume basis of rubber hydrocarbon.

The significance of this statement is explained in an article from a recognized industrial chemical engineering source published on page 60 in this issue. This recognition is nothing new to expert compounders but further confirms the true industrial value of reclaim.

Reclaimers are operating this quarter at substantially the same rate as last and regulating output closely to consumption. Indication of business revival is noted in the interest of rubber manufacturers to contract for late summer and early fall requirements.

As illustrating progress in reclaim development one has only to observe the appearance from time to time of new grades developed for special uses. One of the more recent of such grades is Crimsonite. This is a new red stock containing 51.25 per cent rubber hydrocarbon, exhibiting free milling and plastic quality in high degree, snappy cure, and excellent color. Its physical properties are specific gravity 1.26, tensile 1,300 pounds, and elongation at break 650 per cent.

The quotations on standard market grades have remained unchanged for the past 60 days. The perceptible upward trend in general industry, if continued, will assuredly stimulate reclaim prices to greater firmness in the near future.



Crude and Reclaimed Rubber Consumption

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption	Consumption Per Cent to Crude	United States Stocks*	Exports
1925	132,930	137,105	35.6	13,203	4,571
1926	180,582	164,500	45.9	23,218	5,391
1927	189,144	178,471	47.6	24,980	8,540
1928	208,516	223,000	50.4	24,785	9,577
1929	219,057	224,253	47.9	27,464	12,721
1930	157,967	153,497	41.5	24,008	9,468
1930					
January	13,902	15,766	45.8	24,241	954
February	14,676	14,012	45.5	24,241	1,203
March	16,115	14,669	43.2	24,415	1,048
April	16,511	16,269	43.0	24,592	740
May	16,496	16,411	43.7	23,356	939
June	14,581	13,534	41.6	24,484	641
July	11,411	11,918	42.3	22,477	778
August	11,158	11,321	35.9	21,636	807
September	10,588	10,787	41.4	20,704	656
October	11,437	11,038	39.3	19,912	572
November	10,895	9,075	37.5	22,000	437
December	10,197	8,697	39.3	22,000	693
1931					
January	10,460	11,003	37.6	20,466	649
February	10,871	10,800	37.5	18,878	625
March	12,938	12,524	38.2	18,375	752
April	13,267	11,745	35.2	18,356	577
May	13,478	13,103	34.6	18,088	....

*Stocks on hand the last of the month or year.
Compiled by The Rubber Manufacturers Association, Inc.

New York Quotations

June 26, 1931

High Tensile	Spec. Grav.	Price Per Pound
Super-reclaim. black	1.20	$0.06¼ @ $0.07
red	1.20	.06½ @ .06¾
Auto Tire		
Black	1.21	.05 @ .05¼
Black selected tires	1.18	.05¼ @ .05½
Dark gray	1.35	.06½ @ .06¾
White	1.40	.07½ @ .07¾
Shoe		
Unwashed	1.60	.05¾ @ .06
Washed	1.50	.07¼ @ .07½
Tube		
No. 1	1.00	.08 @ .08¼
No. 2	1.10	.06½ @ .06¾
Truck Tire		
Truck tire, heavy gravity	1.55	.06 @ .06¼
Truck tire, light gravity	1.40	.06¼ @ .06½
Miscellaneous		
Mechanical blends	1.60	.04½ @ .05

RUSSIA

It is understood that the Turkestan plantation of the "Kautsckukonas" trust will harvest about 6,000 tons of rubber latex during the coming year. Some 3,000 workers will be employed in collecting this latex. A factory devoted to the production of pure rubber from this latex is in course of construction, and it is expected to be completed this June.

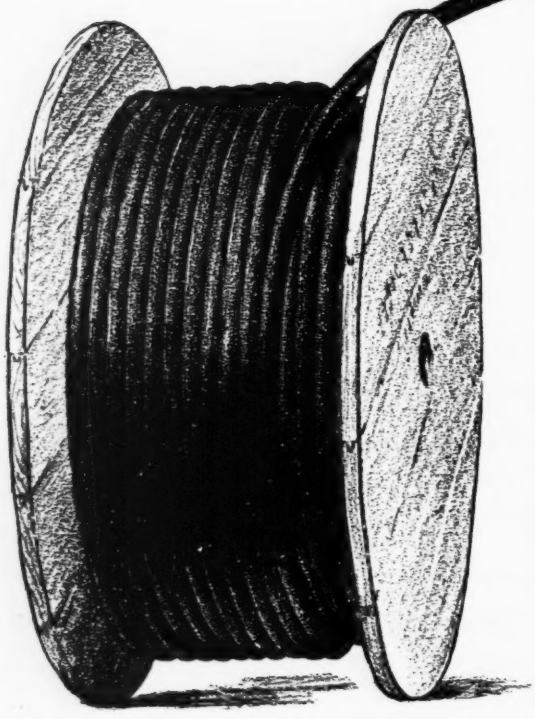
AUSTRIA

Official statistics concerning Austria's imports and exports of crude rubber and manufactures thereof during the first quarter of 1931 follow below:

	Imports Quintals	Exports Quintals
Rubber, gutta percha, etc.	7,496	2,047
Rubber thread, not covered	253	175
Footwear	540	600
Heels and soles	62	378
Hose	60	547
Belting	164	28
Packing	37	1,303
Automobile tires	1,220	427
Other tires	269	65
Tubes	145	66
Other soft rubber goods	356	1,006
Hard rubber and goods thereof	44	352
Rubberized fabric	324	347
Elastic webbings, etc.	137	212

MICRONEX

has revolutionized the modern TIRE!



It is now doing the same for modern WIRE!

MICRONEX (W-5) is now used in proportions of 20-30% on the rubber substance for inside wire compounds and here are the reasons:

1. Improved tensile strength, stiffness and resistance to crushing and bending forces.

2. Better handling during cure (less deformation, etc.)

3. Maintained or improved dielectric properties.

BINNEY & SMITH CO.

41 East 42nd Street, New York, N. Y.

Compounding Ingredients

THE manufacture of tires continues at about the same fair rate as a month ago. The increase, if any, is small because of reduction in output of automobiles. Motorists' tire replacement demand is assuming more marked importance in current production. Mechanical rubber goods production is moderately active especially in goods for automotive purposes. In mechanical lines for general industrial purposes less activity prevails. Footwear activity is generally slow except for sports and general summer wear. The output of heels is steady and seasonal. Curtailment of industrial and building activity and excess of manufactured stock have reacted to slow down insulated wire production. Auto topping plants are active.

ACCELERATORS. The current list of accelerators seems to cover satisfactorily every processing and curing need judging by their numbers and the excellence of their performance. Success and economy in their use depends on fitness and limitation of their variety based on practical tests. The advantages of simplified practice in the matter of accelerator use are worth study by the compounder.

AGE RESISTERS. As in the case of accelerators, age resisters should be selected for their specific adaptation. The selection is ample for all types of deterioration that shorten the life of rubber goods.

CARBON BLACK. Current requirements of tire manufacturers are steady and of moderate proportions. In other fields of rubber goods production the demand is somewhat irregular. The price of standard rubber black is unchanged at 3 cents basis.

LITHARGE. Consumer business in the rubber industry is dull and seasonal at the same prices as last month.

SOFTENERS. These are offered in generous variety and with various adaptations. They are applicable in essentially every branch of the industry.

STEARIC ACID. The price has been reduced ½-cent per pound on all grades. The powdered form is very much favored because of ease in handling and readiness in mixing.

SOLVENTS. Prices were reduced in May and again about the middle of June. The latter reduction was ½-cent per gallon. Consumption is moderate and steady.

ZINC OXIDE. Fair consuming demand early in June fell off as the month advanced, and became very dull and seasonal. The price of this ingredient has held steady and unchanged.

New York Quotations

June 26, 1931

Prices Not Reported Will Be Supplied on Application

Abrasives			
Marble flour	ton	$20.00	@$25.00
Pumice stone, pwd.	lb.	.02½ @	.04
Rottenstone, domestic	ton	23.50 @	28.00
Rottenstone, English	lb.	.03¾ @	
Silica	lb.	.01¼ @	.05
Accelerators, Inorganic			
Lead, carbonate	lb.	.07¼ @	
red	lb.	.07¼ @	
sublimed blue	lb.	.06¾ @	
sublimed white	lb.	.06¾ @	
super-sublimed white	lb.	.06¾ @	
Lime flour, hydrated	ton	20.00 @	
Litharge, casks	lb.	.06¼ @	
Magnesia, calcined, heavy	lb.	.04 @	
carbonate	lb.	.06 @	.07
Orange mineral A.A.A.	lb.	.09¼ @	
Accelerators, Organic			
A-1	lb.	.22 @	.27
A-5-10	lb.	.31 @	.36
A-7	lb.	.55 @	.65
A-11	lb.	.62 @	.75
A-16	lb.	.57 @	.65
A-19	lb.	.58 @	.75
A-32	lb.	.70 @	.75
Accelerator 49	lb.	.35 @	.42
Aldehyde ammonia	lb.	.65 @	.70
Altax	lb.	@	
Barak	lb.	@	
BLE	lb.	@	
Butene	lb.	@	
Captax	lb.	@	
Crylene	lb.	@	
paste	lb.	@	
DBA	lb.	@	
Di-esterex N.	lb.	@	
Di-ethyl-amine, 100%	lb.	@	
DOTG	lb.	.42 @	.49
DPG	lb.	.30 @	.37
Ethylidine aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.37½ @	.40
Grasselerator 808	lb.	@	
833	lb.	@	
Heptene	lb.	@	
base	lb.	@	
Hexamethylenetetramine	lb.	.58½ @	.61
Hydrone	lb.	@	
Lead oleate, No. 999	lb.	.12½ @	
Witco	lb.	.15 @	
Lithex	lb.	@	
Monex	lb.	@	
Novex	lb.	@	
Phenex	lb.	.65 @	.70
Pipsol	lb.	4.00 @	4.50
Plastone	lb.	@	
R-2	lb.	1.75 @	2.15
base	lb.	4.50 @	5.00
R & H 40	lb.	.40 @	.42½
50	lb.	.40 @	.42½
397	lb.	.75 @	.77½
Retardex	lb.	.50 @	
Safex	lb.	@	
SPDX	lb.	.70 @	.75
Super-sulphur No. 1	lb.	@	
No. 2	lb.	@	
Tensilac 39	lb.	.40 @	.42½
Thermlo F	lb.	@	
Thiocarbanilid	lb.	.21 @	.23
TMTT	lb.	3.00 @	3.25
Trimene	lb.	@	
base	lb.	@	
Triphenyl guanidine	lb.	$0.58	@$0.60
Tuads	lb.	@	
Ulto	lb.	3.00 @	
Ureka	lb.	.70 @	1.00
ZBX	lb.	@	
Z-88-P	lb.	.50 @	.60
Zimate	lb.	@	
Acids			
Acetic 28% (bbls.)	100 lbs	2.60 @	2.85
glacial (carboys)	100 lbs.	9.73 @	9.98
Sulphuric, 66°	ton	15.50 @	
Age Resisters			
Age-Rite Gel	lb.	@	
powder	lb.	@	
resin	lb.	@	
white	lb.	@	
Albasan	lb.	@	
Antox	lb.	@	
Oxynone	lb.	.68 @	.90
Resistox	lb.	.54 @	.65
Stabilite	lb.	.57 @	.59
Alba	lb.	.70 @	.75
VGB	lb.	@	
Zalba	lb.	@	
Alkalies			
Caustic soda, 76% solid	100 lbs.	2.60 @	
Antisun Materials			
Heliozone	lb.	@	
Sunproof	lb.	@	
Binders, Fibrous			
Cotton flock, dark	lb.	.09½ @	.12
dyed	lb.	.50 @	.80
white	lb.	.11 @	.17
Colors			
BLACK			
Bone	lb.	.07½ @	
Carbon (see Reenforcers)			
Drop (bbls.)	lb.	.05½ @	.15
Lampblack (commercial)	lb.	.07 @	.08
BLUE			
Blue toners	lb.	.60 @	3.85
Brilliant blue	lb.	2.00 @	3.50
Prussian	lb.	.35 @	.37
Ultramarine	lb.	.06 @	.30
BROWN			
Iron oxide	lb.	@	
Mapico	lb.	.17 @	
Sienna, Italian, raw	lb.	.04½ @	.11
GREEN			
Brilliant green	lb.	3.65 @	
Chrome, light	lb.	.23 @	.25½
medium	lb.	.26 @	.27½
Chromium oxide	lb.	.25 @	.32
Dark green	lb.	1.30 @	
Green toners	lb.	1.00 @	3.60
Light green	lb.	.70 @	
ORANGE			
Cadmium sulphide	lb.	.65 @	.75
Orange lake	lb.	.50 @	.75
Orange toners	lb.	1.60 @	
ORCHID			
Orchid toners	lb.	1.05 @	1.75
PINK			
Pink toners	lb.	1.00 @	1.80
PURPLE			
Permanent purple	lb.	1.50 @	2.00
Purple toners	lb.	.60 @	1.90
RED			
Antimony			
Crimson, R. M. P. No. 3	lb.	$0.48 @	
Sulphur free	lb.	.52 @	
7-A	lb.	.35 @	
Z-2	lb.	.20 @	
Cadmium	lb.	@	
Chinese red	lb.	.90 @	
Crimson red	lb.	.90 @	
Iron Oxides			
bright pure domestic	lb.	.09½ @	.12
bright pure English	lb.	.11 @	
bright reduced English	lb.	.08 @	
bright reduced domestic	lb.	.04 @	
Indian (maroon), pure domestic	lb	.09½ @	
Indian (maroon), pure English	lb.	.09¾ @	
Indian (maroon), reduced English	lb.	.08 @	
Indian (maroon), reduced domestic	lb.	.03 @	.07½
Mapico	lb.	.09½ @	
Medium red	lb.	.90 @	
Oximony	lb.	@	
Red toners	lb.	.95 @	2.75
Rub-er-red	lb.	.08¾ @	
Scarlet red	lb.	1.55 @	
Spanish red oxide	lb.	.02½ @	
Sunburnt red	lb.	.14 @	
Venetian red	lb.	.01½ @	
WHITE			
Lithopone	lb.	.04¾ @	.05
Albalith	lb.	.04½ @	.05
Azolith	lb.	.04½ @	.05
Cryptone	lb.	.06½ @	.07
Grasselli (50 lb. bags)	lb.	.04½ @	.04¾
(400 lb. bbls.)	lb.	.04¾ @	.05
Titanium oxide, pure	lb.	.20 @	
Titanox "B"	lb.	.06½ @	.07
"C"	lb.	.07 @	.07½
Zinc Oxide			
AAA (lead free)	lb.	.06½ @	.07
Azo (factory):			
ZZZ (lead free)	lb.	.06½ @	.07
ZZ (leaded)	lb.	.06¼ @	.06¾
Z (8% leaded)	lb.	.06¼ @	.06¾
Green seal	lb.	.10¾ @	.10¾
Green seal, Anaconda	lb.	.10¾ @	.10¾
Kadox, black label	lb.	.10¾ @	.10¾
blue label	lb.	.09¾ @	.09¾
red label	lb.	.08 @	.08½
Red seal	lb.	.09¾ @	.09¾
Red seal, Anaconda	lb.	.09¾ @	.09¾
Special	lb.	.07 @	.07½
White seal (bbls.)	lb.	.11¾ @	.11¾
White seal, Anaconda	lb.	.11¾ @	.11¾
XX green	lb.	.07 @	.07½
XX red	lb.	.06½ @	.07
Zinc sulphide (bbls.)	lb.	.15 @	.15¼
YELLOW			
Cadmium sulphide	lb.	.65 @	.75
Chrome	lb.	.16½ @	
Lemon yellow	lb.	1.50 @	
Mapico	lb.	.12 @	
Ochre, domestic	lb.	.01½ @	.02½
French	lb.	.03 @	
Oxide, pure	lb.	.09 @	
Yellow toner	lb.	1.75 @	
Zinc, C. P., imported	lb.	.21 @	
Deodorant			
Rodo	lb.	@	

New York Quotations

June 26, 1931

Prices Not Reported Will Be Supplied on Application

Factice—See Rubber Substitutes			
Fillers, Inert			
Asbestine	ton	$13.40	@$13.50
Baryta white (f.o.b. St. Louis, bbls.)	ton	23.00	@
(f.o.b. St. Louis, 80 lb. paper bags)	ton	22.20	@
Barytes, white, spot	ton	32.50	@
off color, spot	ton	25.00	@
Foam "A" (f.o.b. St. Louis)	ton	23.00	@
Basofor	lb.		@
Blanc fixe, dry	lb.	.04½	@
pulp	ton	42.50	@45.00
C-C-O white (f.o.b. St. Louis, bbls.)	ton	15.00	@
Infusorial earth	ton	35.00	@
Slate flour, gray (fac'y)	ton	6.00	@
Suprex white, extra light	ton	70.00	@80.00
Whiting			
Chalk, imported	100 lbs.	.90	@ 1.50
Domestic	100 lbs.	1.00	@
Paris white, English cliffstone	100 lbs.	1.50	@ 3.50
Quaker	ton		@
Sussex	ton		@
Witco (l. c. l.) (f.o.b. New York)	ton	20.00	@
Wood flour	ton	25.00	@
Fillers for Pliability			
Flex	lb.		@
Fumonex	lb.	.03	@ .07
P-33	lb.		@
Thermax	lb.		@
Velvetex	lb.	.02	@ .06
Finishes			
Mica, amber	lb.	.04½	@
Shellac, fine orange	lb.	.60	@
Starch, corn, pwd.	100 lbs.	2.57	@ 2.77
potato	lb.	.05½	@ .06
Talc, domestic	lb.	.01¼	@
dusting	lb.	.02	@
French	ton	18.00	@22.00
Italian	lb.	.02¾	@
Pyrax A	ton		@
Inflating Material			
Ammonium carb., pwd.	lb.	.10½	@
lump	lb.	.10	@
Sponge paste	lb.	.30	@
Mineral Rubber			
Fluxrite (solid)	lb.		@
Genasco (fact'y)	ton	40.00	@42.00
Gilsonite (fact'y)	ton	37.14	@39.65
Granulated M. R.	ton		@
Hydrocarbon, hard	ton		@
Ohmlac Kanak, M. R. (f.o.b. fact'y)	ton	60.00	@
M. 4 (f.o.b. fact'y)	ton	175.00	@
Paradura (fact'y)	ton	60.00	@65.00
Parmr Grade 1	ton	23.00	@28.00
Grade 2	ton	23.00	@28.00
Pioneer, M. R., solid (fact'y)	ton	40.00	@42.00
M. R. granulated	ton	50.00	@52.00
Robertson, M. R., solid (fact'y)	ton	32.00	@80.00
M. R. granulated	ton	32.00	@80.00
Mold Lubricants			
Rusco mold paste	lb.	.12	@ .30
Sericite	lb.		@
Soapbark (cut)	lb.	.07½	@ .08
Soapstone	ton	15.60	@22.00
Oils			
Castor, blown, drums	lb.	$0.13¾	@$0.14
Kerosene	gal.	.10	@
Mineral	gal.	.20	@
Poppy seed oil	gal.	1.70	@
Rapeseed, blown	gal.	.70	@ .72
Red oil, distilled	lb.	.07⅞	@ .08¾
Rubber process	gal.	.25	@
Spindle	gal.	.30	@
Protective Colloids			
Bentonite (dispersion clay)	lb.	.02½	@
Casein, domestic	lb.	.06¾	@ .07½
Reenforcers			
Aluminum flake (sacks, c. l.)	ton	21.85	@
(sacks, l.c.l.)	ton	24.50	@
Carbon Black			
Aerfloted arrow	lb.	.03½	@ .07
Cabot's certified black	lb.	.03	@
Century (works, La., c. l.)	100 lbs.	3.10	@
Disperso (works, La., c. l.)	100 lbs.	3.10	@
Excello	lb.	.03	@
Gastex (f. o. b. fact'y) contracts	lb.	.02½	@
carload	lb.	.02½	@
less carload	lb.	.04¼	@
Micronex	lb.	.03½	@ .08
Ordinary (compressed or uncompressed	lb.	.03	@ .07
Palmer gas black	lb.	.03	@
Supreme	lb.	.03	@
Clays			
Bento	lb.	.03	@
Blue Ridge, dark	ton		@
China	lb.	.01¼	@
Dixie	ton		@
Dusto	lb.	.08	@
Langford	ton		@
Lexo (works)	ton	8.00	@
Par	ton		@
Perfection	ton	20.00	@
Suprex No. 1	ton	8.00	@
No. 2, dark	ton	6.50	@
Glue, high grade	lb.	.27	@ .35
Rubber Substitutes or Factice			
Amberex	lb.	.15	@
Black	lb.	.07	@ .11
Brown	lb.	.07	@ .12
Thiokol	lb.	.30	@
White	lb.	.08	@ .15
Softeners			
Burgundy pitch	100 lbs.	6.00	@
Atlas	100 lbs.	6.50	@
Corn oil, crude	lb.	.07½	@ .07⅝
Cottonseed oil (P. S. Y.)	lb.		@
Cycline oil	lb.	.25	@ .34
Degras	lb.	.03½	@ .04½
Fluxol	ton	18.00	@80.00
Fluxrite (fluid)	lb.		@
Palm oil (Lagos)	lb.	.04⅝	@
(Niger)	lb.	.04	@
(Witco)	lb.	.07½	@
Para-flux	gal.	.15	@
Petrolatum, snow white	lb.	.07½	@ .08
Pigmentar	gal.	.18	@ .23
Pigmentaroil (tank cars, factory)	gal.	0.18	@
(bbls., drums)	gal.	.23	@
Pine oil, dest distilled	gal.	.54	@ .55
Pine pitch	bbl.	6.50	@ 7.00
Pine tar (retort)	gal.	.23	@ .25
Rosin K (280 lbs.)	bbl.	$6.15	@
Rosin oil, compounded	gal.	.35	@
No. 3, deodorized	gal.	.57	@
No. 556, deodorized	gal.	.48	@
Rubberseed, drums	lb.	.09	@ .09½
Rubtack	lb.	.10	@
Tackol	lb.	.09	@ .18
Tonox	lb.		@
Witco No. 20	gal.	.08	@
Woburn oil	lb.	.05½	@
Wobonite No. 94	lb.	.03½	@
Solvents			
Benzol (90% drums)	gal.	.24	@
Carbon bisulphide (drums)	lb.	.05½	@ .12
tetrachloride (drums)	lb.	.09	@ .09½
Dip-Sol	gal.		@
Dryolene, No. 9	gal.		@
Gasoline			
No. 303			
Drums, (c. l.)	gal.	.20	@
Tank cars	gal.	.16	@
Petrobenzol	gal.		@
Rub-Sol	gal.		@
Solvent naphtha (tanks)	gal.	.25	@
Stod-Sol	gal.		@
Troluoil	gal.		@
Turpentine, Venice	lb.	.20	@
dest distilled	gal.	.40	@ .44
Stabilizers			
Laurex, ton lots	lb.		@
Sta-Tex A	lb.		@
Stearates			
Aluminum	lb.	.26	@ .27
Calcium	lb.	.26	@ .27
Magnesium	lb.	.28	@ .29
Zinc	lb.	.27	@ .28
Stearex-B	lb.	.08	@ .12
Stearex flake	lb.	.09	@ .13
Stearic acid, dbl. pres'd.	lb.	.08½	@ .09
Vulcanizing Ingredients			
Sulphur			
Rubber sulphur 99½% superfine	100 lbs.	1.75	@ 2.50
(c.l.)	100 lbs.	2.20	@ 2.55
(l.c.l.)	100 lbs.	2.60	@ 3.10
Soft rubber, 100% (c.l.)	100 lbs.	2.60	@ 2.95
(l.c.l.)	100 lbs.	2.95	@ 3.50
Sulphur chloride	lb.	.03½	@ .04
Superfine commercial flour (bbls.)	100 lbs.	2.55	@ 3.10
(bags)	100 lbs.	2.20	@ 2.80
Tire brand, superfine	100 lbs.	1.75	@
Tube brand, velvet	100 lbs.	2.30	@
Velvet flour (240 lb. bbls.)	100 lbs.	2.95	@ 3.50
(150 lb. bags)	100 lbs.	2.60	@ 3.15
Tellov	lb.		@
Vandex	lb.		@
(See also Colors—Antimony)			
Waxes			
Beeswax, white, com.	lb.	.55	@
carnauba	lb.	.33	@
ceresin, white	lb.	.12½	@
montan	lb.	.06½	@
ozokerite, black	lb.	.28	@
green	lb.	.28	@
Paraffin			
122/124, crude, white scale	lb.	.03¼	@
124/126 crude, white scale	lb.	.03¼	@
125/127 fully refined	lb.	.04¼	@

Tire Production Statistics

	Pneumatic Casings—All Types			Solid and Cushion Tires		
	Inventory	Production	Total Shipments	Inventory	Production	Total Shipments
1928	10,217,708	58,457,873	55,721,937	152,120	508,223	512,602
1929	9,470,368	54,980,672	55,515,884	122,200	407,347	436,027
1930	7,202,750	40,772,378	42,913,108	75,871	204,340	250,635
1931						
January	7,165,846	2,939,702	2,995,479	75,205	12,631	13,072
February	7,628,520	3,188,274	2,721,347	73,338	11,358	12,915
March	8,011,592	3,730,061	3,297,225	68,584	11,424	16,152
April	8,025,135	3,955,491	3,945,525	64,369	11,610	15,445

	Inner Tubes—All Types			Cotton and Rubber Consumption Casings, Tubes, Solid and Cushion Tires		Consumption of Motor Gasoline (100%) Gallons
	Inventory	Production	Total Shipments	Cotton Fabric Pounds	Crude Rubber Pounds	
1928	12,087,464	60,131,381	57,845,189	222,243,398	600,423,401	13,633,452,000
1929	10,245,365	55,062,886	56,473,303	208,824,653	598,994,708	14,748,552,000
1930	7,999,477	41,936,029	43,952,139	158,812,462	476,755,707	16,200,894,000
1931						
January	7,551,503	2,898,405	3,249,734	12,738,467	36,318,980	1,127,532,000
February	7,936,773	3,132,770	2,720,135	12,002,161	36,651,119	1,097,208,000
March	8,379,974	3,559,644	3,031,279	14,040,803	41,850,638	1,303,302,000
April	8,330,155	3,693,222	3,708,949	15,243,625	45,016,344	1,402,800,000

Rubber Manufacturers Association figures representing 80 per cent of the industry since January, 1929, with the exception of gasoline consumption.

Cotton and Fabrics

THE burst of optimism which resulted after President Hoover called for a year's suspension of all debt payments sent commodity and stock prices soaring. Cotton registered a substantial rise, but whether it will be maintained is a question difficult to answer at present.

Nothing in the statistical picture would have bolstered prices the way the President's statement did, but some dealers believe that the great buying wave which followed simply demonstrated that the market was in an oversold condition. Cotton is too cheap is the opinion of many, and they feel that there is a firmer tone in the cotton market.

One development which traders fear is that the heavy buying by mills will result in overstocked shelves again. The Cotton Textile Institute is working to induce spinners to curtail production to demand, and the optimistic buying may nullify its efforts.

The weather news is not yet a dominant factor. The crop is perhaps ten days behind in some places, but that condition is not serious; and a change in the weather might alter conditions for better or worse.

Summer is usually a dull period in the textile industry; so the market cannot expect much help from that quarter. The weather may be an influence either way in the next month or two, and no one can say whether the optimism induced by the political developments will be permanent or not.

Week ended May 30. Prices declined on each of the first three days of the week, reaching successively the season's low and then the lowest point registered in sixteen years. On Wednesday the July contract hit 8.48 cents, the December contract 9.03 cents. Net loss for the week was about 30 points. On Thursday the market was steadier, and on Friday trade buying firmed up the market, and prices gained 12 to 14 points before the holiday.

COTTON BULL POINTS

1. Mills, foreign and domestic bought heavily of raw cotton last month.
2. Fertilizer sales were 30 per cent lower in the last season; this decrease may result in a lesser output.
3. Stocks of textile goods are low.
4. Danger from insects is said to be increasing.
5. Cotton Week resulted in some fine sales.
6. The Cotton Textile Institute is conducting a campaign for the curtailment of output to demand.
7. Activity in the cotton spinning industry for May was 89.9 per cent of capacity, compared with 94.3 per cent in April, and 83.6 per cent in May last year.
8. Active spindle hours during May averaged 204 per spindle in place, compared with 216 for April and 197 for May last year.

COTTON BEAR POINTS

1. World consumption of American cotton in May was 943,000 bales, compared with 999,000 in April and 1,026,000 last year in May.
2. Consumption for the season was estimated to be almost 15 per cent behind last year by the New York Cotton Exchange Service.
3. The value of cotton exported during May declined to $18,746,000 from $22,766,000 in April.
4. Acreage will be cut only about 11 per cent.
5. Weather has, on the whole, been favorable.
6. Domestic consumption during May was 465,770 running bales, compared with 508,744 for April and 473,284 for May last year.
7. Shipments during May were 91.2 per cent of production; new business booked was 71 per cent of production; stocks on hand increased 7 per cent; unfilled orders decreased 15.5 per cent.
8. The 1,241,000 bales of cotton held by the Farm Board are an uncertain and disturbing factor.

The same reasons that accounted for the decline in the previous week were responsible for this week's drop—the weak stock market and the favorable weather reports. The foreign markets were steady on the day of our biggest decline, and the close of the Liverpool market on Friday because of the Whitsuntide holiday relieved the pressure here.

Private crop estimates issued during the week put reduction at 9.2, 11.9, and 7.8 per cent. Conditions of the crop were put at about 70 per cent. These forecasts were in line with the expectation of from 8 to 12 per cent reduction.

The New York Cotton Exchange Service estimated world's consumption of American cotton in April at 999,000 bales, compared with 973,000 in March and 1,068,000 in April last year. Exports for the season are now 85,000 bales under those at this time last year, compared with almost 500,000 bales behind during the Winter. The world's stock of American cotton on May 1 is estimated at 11,645,000 bales, or 2,745,000 larger than last year; while the stock in India on March 1 was estimated at 4,152,000 bales, or 500,000 less than last year.

From present indications, with the seasonal weather experienced over the cotton belt, the yield this year will be 13,500,000 bales. Droughts are reported in Egypt, with the possibility that the crop may be smaller; but Russia is reported to be planting a large area which will offset the decrease in Egypt.

Prices at the close of May 30 were:

Position	High	Low	Close	Previous Close
July	8.76	8.58	8.71/73	8.59/61
Oct.	9.10	8.93	9.04	8.91/92
Dec.	9.34	9.14	9.26/27	9.13/14
Jan.	9.45	9.28	9.38	9.24
Mar.	9.61	9.46	9.59	9.45/46

Week ended June 6. National Cotton Week is over. From all preliminary reports it was a success. George A. Sloan, president of the Cotton Textile Institute, received telegrams from important retailers all over the country telling of the interest and the support which the idea received. Retailers and department stores put on all kinds of sales and demonstrations. In one southern city a Cotton Ball was held in honor of the event.

Tangible evidence of results can be seen in the index for cotton cloth which

New York Quotations

June 26, 1931

Drills

38-inch 2.00-yard	yard	$0.11 @
40-inch 3.47-yard		.06 @
50-inch 1.52-yard		.14 @
52-inch 1.90-yard		.11½ @
52-inch 2.20-yard		.10 @
52-inch 1.85-yard		.11⅞ @

Ducks

38-inch 2.00-yd. D. F	yard	.11 @
40-inch 1.45-yard S. F		.15⅛ @
72-inch 1.05-yard D. F		.22 @
72-inch 16.66-ounce		.24¾ @
72-inch 17.21-ounce		.25 @

MECHANICAL

Hose and belting	pound	.21½ @

TENNIS

52-inch 1.35-yard	yard	.16 @

Hollands

RED SEAL

36-inch	yard	.12¾ @
40-inch		.13¾ @
50-inch		.19¼ @

GOLD SEAL

40-inch, No. 72	yard	.16¼ @

Osnaburgs

40-inch 2.35-yard	yard	$0.09⅛ @
40-inch 2.48-yard		.08⅞ @
40-inch 3.00-yard		.07¾ @
40-inch 10-oz. part waste		.10⅜ @
40-inch 7-oz. part waste		.07 @
37-inch 2.42-yard		.09 @

Raincoat Fabrics

COTTON

Bombazine 64 x 60	yard	.09½ @
Bombazine 60 x 48		.08½ @
Plaids 60 x 48		.11 @
Plaids 48 x 48		.10¼ @
Surface prints 64 x 60		.12 @
Surface prints 60 x 48		.11 @
Print cloth, 38½-in., 60 x 48		.04¼ @
Print cloth, 38½-in., 64 x 60		.05 @

Sheetings, 40-inch

48 x 48, 2.50-yard	yard	.06½ @
48 x 48, 2.85-yard		.05½ @
64 x 68, 3.15-yard		.07 @
56 x 60, 3.60-yard		.05¾ @
44 x 48, 3.75-yard		.04¾ @
44 x 40, 4.25-yard		.04½ @

Sheetings, 36-inch

48 x 48, 5.00-yard	yard	.04⅛ @
44 x 40, 6.15-yard		.04⅜ @

Tire Fabrics

SQUARE WOVEN 17¼-ounce

Peeler, karded	pound	$0.31 @

BUILDER 23/11

Peeler, karded	pound	.31 @

BUILDER 10/5

Peeler, karded	pound	.25 @

CORD 23/5/3

Peeler, karded	pound	.31 @

CORD 23/4/3

Peeler, karded	pound	.33 @

CORD 23/3/3

Peeler, karded	pound	.36 @

CORD 15/3/5

Peeler, karded	pound	.29 @

CORD 13/3/3

Peeler, karded	pound	.28 @

LENO BREAKER

8-oz. Peeler, karded	pound	.31 @
10-oz. Peeler, karded		.31 @

CHAFER

9.5-oz. Peeler, karded	pound	.33 @
12-oz. Peeler, karded		.34 @
14-oz. Peeler, karded		.33 @

ran contrary to expectations and rose for the week ended May 30. The *Times* index stood at 94.5, compared with 93.3 for the preceding week, and with 88.0 for the last week of May last year.

The *Daily News Record* reported, "The most interesting reports in the gray cloth market have had to do with inquiry from bag manufacturers for sheetings and osnaburgs. Some of this inquiry has been in the market for a number of days and is said to involve 1½ to 2 million yards. The goods, it was stated, are wanted for July/August. It has been some time since there has been any fair action on the part of the bag trade, which accounts for the interest aroused by these inquiries."

Prices on the Exchange, however, again followed the stock market and were further weakened by the fine weather reports. On Monday and Tuesday cotton dropped to the lowest since 1915 and to the lows of the season. With the announcement by several large banks that they were cutting the margin requirements for stocks from 25 per cent to 20 per cent, the stock market rallied briskly, followed by the cotton market. Profit taking broke stocks again, and this action combined with the good crop weather sent cotton off 30 to 35 points on Friday and Saturday. For the week prices were off from 30 to 40 points.

Prices at the close of June 6 were:

Position	High	Low	Close	Previous Close
July	8.45	8.30	8.31	8.55/56
Oct.	8.82	8.65	8.66/67	8.90
Dec.	9.04	8.88	8.88/90	9.13/14
Jan.	9.15	9.00	9.00	9.25
Mar.	9.35	9.18	9.19	9.43/44
May	9.52	9.37	9.37	9.63

Week ended June 13. Strong trade buying and active buying for foreign mills accounted for a gain of from 25 to 32 points for the week in the cotton market. From Wednesday to Friday, inclusive, the market rose steadily. The firmness in the stock market undoubtedly strengthened quotations until Saturday, when weakness in stocks was responsible for a weakening of the cotton market and losses of a few points.

Because of the large stocks on hand the announcement made by Carl Williams, of the Farm Board, that the holdings of 1,241,000 bales held by the Cotton Stabilization Corp. are not for sale is an important one.

The May consumption figures released on Saturday by the Census Bureau put the total at 465,770 bales of lint and 66,949 of linters, compared with 508,744 and 66,807 in April and 473,284 and 67,201 in May last year. This figure was somewhat lower than expected.

Cotton spindles active during May numbered 26,397,906, compared with 26,645,404 during April this year and 28,357,908 during May last year.

Prices at the close of June 13 were:

Position	High	Low	Close	Previous Close
July	8.63	8.49	8.55/56	8.60/62
Oct.	9.01	8.87	8.92	8.98
Dec.	9.23	9.10	9.17/18	9.21/22
Jan.	9.34	9.22	9.28	9.32
Mar.	9.54	9.42	9.47	9.54/55
May	9.74	9.62	9.68/69	9.74

Week ended June 20. Cotton prices showed substantial advances on three days of the week, and lesser declines on the other three days so that the net change was a gain of from 30 to 38 points.

WEEKLY AVERAGE PRICES OF MIDDLING COTTON

Week Ended	Cents per Pound
May 30	8.69
June 6	8.54
June 13	8.52
June 20	8.83

The first advance came on Tuesday because of the big consuming demand, the next one on Friday because shorts were covering and continental spinners were purchasing heavily on the previous day's declines. On Saturday the market responded to the stronger tone in stocks, which was a result of President Hoover's statement that he had had conferences with political leaders in Washington as to steps to be taken for economic recovery.

A definite announcement by President Hoover was given on Sunday. He proposed that all debt settlements be suspended for a year so that the world could devote all its energies to getting back on its feet.

Domestic consumption of cotton, according to the Cotton Exchange Trade Service, is about 13 per cent less than last season, at present about 21 per cent below the average for the last five years, and about 18 per cent below the ten-year average.

The Association of Cotton Textile Merchants of New York reported that shipments during May were 91.2 per cent of production; new business booked during the month was 71 per cent of production; stocks on hand at the end of the month increased 7 per cent; while unfilled orders decreased 15.5 per cent.

The decrease in unfilled orders was said to be normal at this time of the year, and if mills curtail production to consumption for the next few months, they will be in good position when better business is resumed in the Fall.

Prices at the close of June 20 were:

Position	High	Low	Close	Previous Close
July	8.93	8.75	8.89/91	8.70/72
Oct.	9.34	9.16	9.31/32	9.11/12
Dec.	9.58	9.40	9.55/56	9.34/36
Jan.	9.66	9.51	9.65/66	9.45
Mar.	9.86	9.71	9.85/86	9.63/65
May	10.06	9.90	10.04	9.86

During the week ended June 27 a flood of buying orders lifted the market $3.50 a bale on Monday, following the announcement of President Hoover's proposal for a debt moratorium of one year.

The profit taking that resulted on Tuesday was halted by the continuance of buying orders; while the continued strength sent shorts to cover on Wednesday and sent the market up 10 to 12 more points.

The Census Bureau announced that the cotton spinning industry operated during May at 89.9 per cent capacity on a single shift basis, compared with 94.3 per cent in April, and 83.6 per cent in May last year.

Spindles were active on an average of 204 hours for May, compared with 216 for April and 197 for May last year.

World consumption of American cotton in May was estimated at 943,000 bales, 83,000 bales less than last year. Consumption in the first ten months of the season ended May 31 was 9,285,000 bales, compared with 11,261,000 bales in the corresponding period of the preceding season.

June 24, the market was characterized as "thoroughly demoralized," and prices were very cheap. July cotton closed at 9.64 to 9.67 cents. On June 25 the market showed good buying activity and closed steady at 7 to 12 points up.

Cotton Fabrics

DUCKS, DRILLS, AND OSNABURGS. There is active demand for limited lots for quick shipment. Some contracts are being placed for distant future deliveries. It is considered that from about the middle of July to the last of August a better demand will appear for fabrics on the basis of larger volume in the individual transactions and for deliveries during the later months of the year.

Supplies in hands of jobbers and consumers are not excessive. The mills are steadily working into a better position as regards inventory.

RAINCOAT FABRICS. A slight improvement is noted in market conditions over a month ago, and prices are unchanged. Raincoat manufacturers are not busy, but sales are fair with every recurring rain. As for fall styles checks are popular, holding over from last season. Prints in imitation of corduroy are being received with favor as a new fall style item in various popular colors.

SHEETING. There is very little activity in the market for these goods; consequently prices have dropped to new lows in sympathy with the lower raw cotton market. Stocks of sheetings are large, and no improvement in prices can be expected until some of these goods are sold. There is hope that the mills may curtail production extensively this summer to give the market a chance to reduce stocks.

TIRE FABRICS. Light calls from tire manufacturers for small lots feature the general demand for tire fabrics. Chafers are moving slowly. The market on all tire fabrics is quiet and unchanged but inclined to be firmer. Some demand for cord fabric of Egyptian cotton is noted at nominal prices.

N. Y. Outside Market

(*Continued from page* 102)

Factory buyers are not anxious to make purchases. They have plenty of rubber on hand and only are active in the market when prices break sharply.

Tire makers are said to be carrying low inventories, and they should benefit by any increase in buying.

Actual on spot on June 25 was offered at 6⅝ cents; June-Sept. at 6¾ cents; Oct.-Dec. at 7 cents. In London spot was offered at 3 15/16 pence and in Amsterdam at 6¾ cents on shipments from the Far East in anticipation of the possibility of Dutch restriction becoming an actuality. Producers are thus looking for a premium, and consumers for a bargain. This condition makes for no business.

United States Statistics

Imports of Crude and Manufactured Rubber

	March, 1931 Pounds	March, 1931 Value	Three Months Ended March, 1931 Pounds	Three Months Ended March, 1931 Value
UNMANUFACTURED—*Free*				
Crude rubber	90,480,856	$7,356,505	247,981,730	$21,112,065
Liquid latex	883,783	75,285	2,361,043	235,463
Jelutong or pontianak	1,399,888	127,803	3,339,360	300,800
Balata	146,945	23,568	288,200	69,239
Gutta percha	.....	.....	123,330	13,343
Guayule	.....	.....	.....	.....
Siak, scrap, and reclaimed	744,653	15,217	2,105,975	28,387
Totals	93,656,125	$7,598,378	256,199,638	$21,759,297
Chicle—*Dutiable*	.....	.....	.....	.....
Chicle, crude—*Free*	864,776	$426,675	2,664,109	$1,311,150
MANUFACTURED—*Dutiable*				
Tires—*number*	1,695	$4,347	3,247	$15,470
Other rubber manufactures	.....	77,947	.....	210,928
Totals	.....	$82,294	.....	$226,398

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber	6,334,135	$539,152	14,235,248	$1,250,521
Balata	.....	.....	39,675	8,329
Guayule	.....	.....	24,700	3,575
Gutta percha, rubber substitutes, and scrap	30	19	2,202	382
Rubber manufactures	.....	995	.....	2,246
Totals	.....	$540,166	.....	$1,265,053

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed	1,685,110	$82,133	4,540,503	$224,743
Scrap and old	4,168,019	112,225	12,731,095	330,317
Rubberized automobile cloth—*sq. yd.*	110,347	50,017	236,923	107,266
Other rubberized piece goods and hospital sheeting—*sq. yd.*	116,736	48,361	267,116	114,969
Footwear				
Boots—*pairs*	29,821	73,549	103,199	250,580
Shoes—*pairs*	83,840	56,923	248,349	179,684
Canvas shoes with rubber soles—*pairs*	224,820	146,454	522,842	351,523
Soles—*doz. pairs*	6,681	16,795	16,194	46,701
Heels—*doz. pairs*	78,868	52,832	230,956	157,832
Water bottles and fountain syringes—*number*	37,808	15,189	87,583	36,060
Gloves—*doz. pairs*	8,645	23,380	22,611	60,686
Other druggists' sundries	.....	34,618	.....	76,846
Balloons—*gross*	55,214	49,743	166,025	147,240
Toys and balls	.....	11,528	.....	24,661
Bathing caps—*doz.*	41,056	67,490	58,497	109,290
Bands	49,153	19,583	125,179	49,810
Erasers	50,858	32,434	113,803	69,985
Hard rubber goods				
Electrical goods	188,703	21,209	441,511	50,471
Other goods	.....	20,517	.....	66,155
Tires				
Truck and bus casings, *number*	47,694	892,909	115,607	2,337,946
Other automobile casings, *number*	159,677	1,123,511	411,721	3,102,866
Tubes, auto—*number*	130,735	176,960	344,607	488,761
Other casings and tubes, *number*	13,141	25,037	23,984	44,524
Solid tires for automobiles and motor trucks *number*	1,188	34,031	3,037	102,390
Other solid tires	134,827	20,276	474,928	72,332
Tire sundries and repair materials	.....	74,990	.....	217,575
Rubber and friction tape	108,213	35,047	321,407	96,228
Belting	287,332	133,088	815,771	384,291
Hose	542,157	144,624	1,423,278	408,089
Packing	132,156	57,037	360,690	147,772
Thread	158,556	155,149	411,701	406,762
Other rubber manufactures	.....	179,232	.....	453,549
Totals	.....	$3,986,871	.....	$10,717,904

Crude Rubber Imports by Customs Districts

Including latex, dry rubber content

	April, 1931 Pounds	April, 1931 Value	April, 1930 Pounds	April, 1930 Value
Massachusetts	4,334,184	$367,123	3,135,623	$566,150
New York	81,451,560	6,393,105	80,046,043	11,728,969
Philadelphia	3,514,495	243,944	1,118,483	150,644
Maryland	1,183,164	73,941	720,780	92,939
Virginia	.....	.....	252,512	31,857
Georgia	825,428	62,358	1,439,225	176,697
Los Angeles	9,026,504	622,434	8,366,666	1,162,942
San Francisco	136,804	14,267	133,454	20,751
Hawaii	224	21	.....	.....
Oregon	.....	.....	33,600	6,207
Ohio	10,350	1,781	6,385,588	853,671
Colorado	112,000	7,834	620,480	91,017
Totals	100,594,713	$7,786,808	102,252,454	$14,881,844

United Kingdom Statistics

Imports

	April, 1931 Pounds	April, 1931 Value	Four Months Ended April, 1931 Pounds	Four Months Ended April, 1931 Value
UNMANUFACTURED				
Crude rubber				
From				
Straits Settlements	11,507,600	£178,153	62,760,900	£1,002,957
Federated Malay States	5,856,200	89,163	26,754,200	468,604
British India	825,500	12,209	5,437,700	91,611
Ceylon and Dependencies	2,310,100	35,291	11,339,100	192,542
Java and Dutch Borneo	3,408,400	53,898	11,641,000	196,815
Sumatra and other Dutch possessions in Indian Seas	2,382,400	38,917	7,163,600	124,776
Other countries in East Indies and Pacific not elsewhere specified	326,500	4,284	1,676,800	29,084
Brazil	356,200	6,062	2,328,100	50,553
South and Central America (except Brazil)	10,600	132	12,100	156
West Africa				
French West and Equatorial Africa	2,200	69	16,200	303
Gold Coast	28,800	448	119,400	1,869
Other parts of West Africa	220,600	3,558	575,600	9,600
East Africa, including Madagascar	10,000	136	153,100	2,566
Other countries	92,700	1,873	448,800	9,072
Totals	27,337,800	£424,193	130,426,600	£2,180,508
Gutta percha and balata	308,200	19,998	1,284,000	96,835
Waste and reclaimed rubber	652,600	5,638	2,774,100	26,771
Rubber substitutes, synthetic	1,100	33	5,300	124
Totals	28,299,700	£449,862	134,490,000	£2,304,238
MANUFACTURED				
*Tires and tubes				
Pneumatic				
Outer covers	.....	£18,985	.....	£62,495
Inner tubes	.....	5,483	.....	19,733
Solid tires	.....	4,914	.....	12,347
Boots and shoes—*doz. pairs*	168,964	168,578	480,623	519,675
Other rubber manufactures	.....	147,993	.....	588,927
Totals	.....	£345,953	.....	£1,203,177

Exports

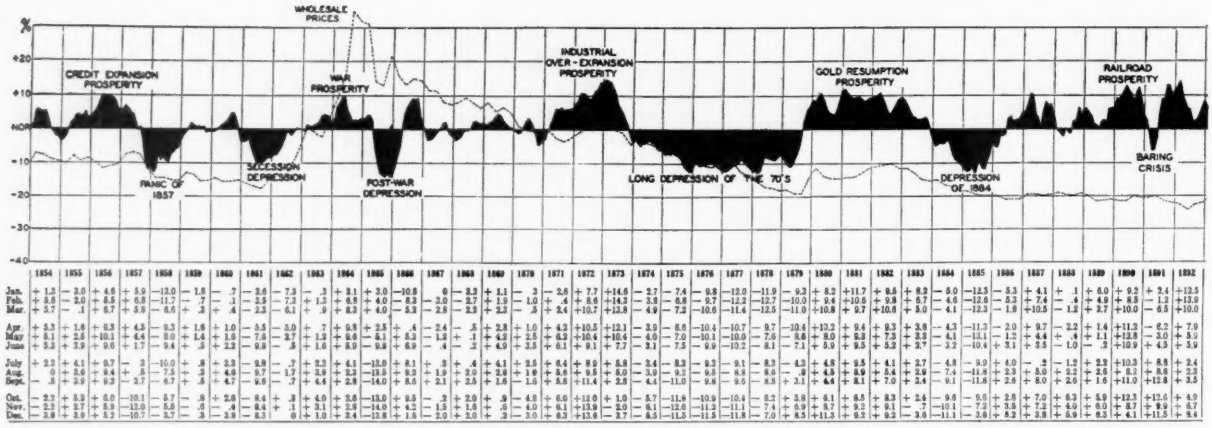
UNMANUFACTURED				
Waste and reclaimed rubber	1,210,600	£6,849	5,171,800	£31,534
Rubber substitutes, synthetic	44,900	844	173,400	3,294
Totals	1,255,500	£7,693	5,345,200	£34,828
MANUFACTURED				
Tires and tubes				
Pneumatic				
Outer covers	.....	£274,881	.....	£913,105
Inner tubes	.....	35,489	.....	114,369
Solid tires	.....	4,669	.....	18,989
Boots and shoes—*doz. pairs*	21,112	25,445	63,821	79,359
Other rubber manufactures	.....	182,655	.....	668,423
Totals	.....	£523,139	.....	£1,794,245

Exports—Colonial and Foreign

UNMANUFACTURED				
Crude rubber				
To				
Soviet Union (Russia)	1,869,400	£49,017	10,916,800	£300,338
Sweden, Norway, and Denmark	132,000	3,779	549,400	14,413
Germany	1,272,800	22,116	6,213,500	111,126
Belgium	424,700	7,962	3,767,000	66,327
France	1,674,100	30,014	6,585,300	134,255
Spain	204,200	6,179	512,800	14,518
Italy	148,900	2,940	1,683,600	30,034
Other countries in Europe	173,300	4,407	1,212,500	32,537
United States	159,200	4,037	489,500	12,972
Other countries	132,900	3,615	537,400	15,400
Totals	6,191,500	£134,066	32,467,800	£731,920
Gutta percha and balata	79,200	7,745	275,100	27,412
Waste and reclaimed rubber	3,900	71	82,000	1,376
Rubber substitutes, synthetic	.....	.....	.....	.....
Totals	6,274,600	£141,882	32,824,900	£760,708
MANUFACTURED				
Tires and tubes				
Pneumatic				
Outer covers	.....	£1,335	.....	£35,953
Inner tubes	.....	215	.....	1,834
Solid tires	.....	4	.....	4
Boots and shoes—*doz. pairs*	2,748	2,671	6,735	9,184
Other rubber manufactures	.....	5,014	.....	18,749
Totals	.....	£9,239	.....	£65,724

* Motor cars, motorcycles, parts and accessories, liable to duty from Sept. 29, 1915, until Aug. 1, 1924, inclusive, and after July 1, 1925. Commercial vehicles, parts, and accessories were exempt from duty until Apr. 30, 1926, inclusive, and tires and tubes until Apr. 11, 1927, inclusive.

American Industrial



	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892
Jan.	+ 1.3	— 2.0	+ 4.6	+ 5.9	—12.0	— 1.8	— .7	— 3.6	— 7.3	— .3	+ 3.1	+ 2.0	—10.8	0	— 2.3	+ 1.1	— .3	— 2.6	+ 7.7	+14.6	— 2.7	— 7.4	— 0.8	—12.0	—11.9	— 9.3	+ 8.2	+11.7	+ 9.5	+ 8.2	— 5.0	—12.5	— 5.3	+ 4.1	+ .1	+ 6.0	+ 9.2	+ 2.4	+12.5
Feb.	+ 8.6	— 2.0	+ 8.5	+ 0.9	—11.7	— .7	— 1.1	— 2.5	— 7.3	+ 1.3	+ 0.5	+ 4.0	— 8.3	— 2.0	— 2.7	+ 1.9	— 1.0	+ .4	+ 8.6	+14.3	— 3.8	— 6.8	— 0.7	—12.2	—12.7	—10.0	+ 9.4	+10.6	+ 9.8	+ 6.7	— 4.0	—12.6	— 5.3	+ 7.4	— .4	+ 4.9	+ 8.8	— 1.2	+13.0
Mar.	+ 5.7	— .1	+ 6.7	+ 5.8	— 6.6	+ .3	+ .4	— 2.5	— 6.1	+ .9	+ 8.3	+ 4.0	— 5.3	— 2.8	— 2.3	+ 2.3	— .5	+ 2.4	+10.7	+12.8	— 4.9	— 7.2	—10.6	—11.4	—12.5	—11.0	+10.8	+ 9.7	+10.6	+ 5.0	— 4.1	—12.3	— 1.9	+10.5	— 1.2	+ 3.7	+10.0	— 6.5	+10.0
Apr.	+ 3.3	+ 1.6	+ 0.3	+ 4.5	— 0.3	+ 1.6	+ 1.0	— 5.5	— 5.0	+ .7	+ 0.9	+ 2.5	+ .4	— 2.4	— .5	+ 2.8	+ 1.0	+ 4.2	+10.5	+12.1	— 2.9	— 8.6	—10.4	—10.7	— 9.7	—10.4	+10.3	+ 9.4	+ 8.3	+ 3.8	— 4.3	—11.3	— 2.0	+ 9.7	— 2.2	+ 1.4	+11.3	— 6.2	+ 7.9
May	+ 0.1	+ 2.5	+10.1	+ 4.4	— 0.0	+ 1.6	+ 1.0	— 7.6	— 3.7	+ 1.3	+ 0.6	— 0.1	+ 0.3	— 1.3	+ .1	+ 4.3	+ 2.5	+ 6.2	+10.4	+10.6	— 4.0	— 7.0	—10.1	—10.0	— 7.6	— 9.6	+ 8.0	+ 9.3	+ 7.3	+ 3.9	— 4.1	—13.1	— 1.7	+ 8.4	+ .4	+ 1.1	+12.8	— 5.0	+ 5.0
June	+ 3.2	+ 3.9	+ 0.6	+ 1.7	— 9.4	+ .3	+ 2.2	— 8.8	— .3	+ 1.6	+ 3.0	— 0.8	+ 0.9	— .4	— .2	+ 4.3	+ 2.3	+ 6.1	+ 9.1	+ 7.7	— 2.1	— 7.5	— 9.9	—10.2	— 8.1	— 7.1	+ 5.9	+ 9.5	+ 5.2	+ 2.7	— 3.2	—10.4	+ 3.1	+ 8.5	— 1.0	— .3	+10.3	+ 4.3	+ 3.9
July	+ 2.3	+ 4.1	+ 0.7	— .3	—10.0	+ .9	+ 2.3	— 9.9	— .7	+ 2.3	+ 4.1	—13.0	+ 0.1	+ .3	+ .4	+ 4.1	+ 2.8	+ 6.4	+ 9.0	+ 8.9	— 2.4	— 9.3	— 9.3	— 9.1	— 8.3	— 4.3	+ 4.8	+ 9.5	+ 4.1	+ 2.7	— 4.8	— 9.9	+ 4.0	— .3	— 1.3	+ 2.3	+10.3	+ 8.8	+ 2.4
Aug.	— .6	+ 2.6	+ 0.4	+ .5	— 7.5	+ .3	+ 0.9	— 9.7	— 1.7	+ 3.8	+ 2.3	—13.5	+ 0.3	+ 1.9	+ 2.0	+ 2.8	+ 1.8	+ 5.6	+ 9.5	+ 8.0	— 3.0	— 9.2	— 9.5	— 8.8	— 8.0	— .8	+ 4.5	+ 8.9	+ 3.4	+ 2.9	— 7.4	—11.8	+ 2.3	— 3.0	+ 1.2	+ 2.8	+ 8.5	+ 2.8	+ 2.5
Sept.	— .5	+ 2.9	+ 0.3	+ 2.7	— 6.7	+ .5	+ 4.7	— 9.0	— .7	+ 4.4	+ 2.8	—14.0	+ 0.5	+ 2.1	+ 2.5	+ 1.6	— 1.5	+ 5.5	+11.4	+ 2.8	— 4.4	—11.0	— 9.8	— 9.5	— 8.3	+ 3.1	+ 4.4	+ 8.1	+ 7.0	+ 3.4	— 9.1	—11.8	+ 2.6	+ 8.0	+ 2.6	+ 1.6	+11.0	+12.8	+ 3.5
Oct.	— 2.2	+ 5.3	+ 8.0	—10.1	— 8.7	— .8	+ 2.6	— 8.4	+ .3	+ 4.0	+ 2.6	—13.0	+ 0.5	— .2	+ 2.0	+ .9	— 4.9	+ 6.0	+12.0	+ 1.0	— 5.7	—11.8	—10.9	—10.4	— 8.5	+ 3.8	+ 8.1	+ 8.5	+ 8.3	+ 2.4	— 9.8	— 9.6	+ 2.8	+ 7.0	+ 0.3	+ 5.9	+12.3	+12.6	+ 4.9
Nov.	— 2.3	+ 2.7	+ 8.9	—12.9	— 5.6	— .3	— .4	— 8.4	+ .1	+ 3.1	+ 2.9	—14.0	+ 0.2	— 1.5	+ 1.8	+ .5	— 4.0	+ 6.1	+13.9	— 2.0	— 6.1	—12.6	—11.3	—11.1	— 7.4	+ 6.9	+ 8.7	+ 9.2	+ 9.1	— .7	—10.1	— 7.2	+ 3.6	+ 7.2	+ 4.0	+ 6.0	+ 8.7	+ 9.9	+ 6.7
Dec.	— 2.8	+ 2.9	+ 8.2	—10.7	— 3.7	— .3	— 2.9	— 8.3	0	+ 1.0	+ 2.4	—12.8	+ 1.6	— 2.0	+ 2.0	+ .3	— 3.0	+ 8.3	+12.6	— 2.7	— 8.3	—11.5	—11.5	—11.8	— 7.0	+ 8.5	+11.3	+ 9.2	+ 9.2	— 3.6	—11.1	— 3.6	+ 8.2	+ 2.8	+ 5.9	+ 8.3	+ 4.1	+11.5	+ 9.4

The above chart is the result of a research study of the business cycles of American industry during the past 78 years, made by the Cleveland Trust Co., Cleveland, O. Referring to the index, Col. Leonard P. Ayres, vice president of the trust company, states that it is composed of 10 series of annual data from 1854 to 1901. The fluctuations above and below normal were computed for each series separately, and the 10 were then combined in one. Normal values for each series were means between one set of lines running from one prosperity peak to the next, and another similar set of lines running from each depression bottom to the next. The annual figures from 1901 to 1919 are those of the Thomas index of manufacturing production with mineral production added, and from 1919 to date the monthly figures of the Federal Reserve (Thomas) index of industrial production have been used. All the data were reduced to a per capita basis.

The computations of the fluctuations of each of the 10 series constituting the index from 1854 to 1901 were carried through to include 1930, and the coefficient of correlation between each of them and the production series running from 1901 through 1930 was computed. Each of the 10 series was then given a weight based on its degree of correlation with the production

World Rubber Shipments—Net Exports

Long Tons

	Calendar Years		1931			
	1929	1930	Feb.	Mar.	Apr.	May
British Malaya						
Gross Exports	579,524	547,043	41,951	48,589	43,453	44,281
Imports	161,612	133,876	9,672	12,009	9,977	10,479
Net	417,912	413,167	32,279	36,580	33,476	33,802
Ceylon	80,795	76,406	6,365	5,881	*3,487	*4,534
India and Burma	11,720	10,782	1,041	1,209	641	.....
Sarawak	11,079	10,310	945	930	788	869
British No. Borneo	7,381	7,052	*600	*600	*600	*600
Siam	5,024	4,349	409	536	340	413
Java and Madura	66,010	69,755	4,869	5,434	6,473	.....
Sumatra E. Coast	87,589	79,396	7,206	7,104	6,063	.....
Other N. E. Indies	134,732	115,254	9,001	11,258	8,759	.....
French Indo-China	10,147	9,877	1,018	992	610	702
Amazon Valley	21,148	14,260	1,271	1,338	629	1,110
Other America	996	516	*75	*75	*75	*75
Guayule	1,275	1,095	.....	.....	.....	.....
Africa	4,596	3,961	*300	*300	*300	*300
Totals	860,404	816,180	65,379	72,237	62,241	.....

*Estimate. *Compiled by Rubber Division, Department of Commerce, Washington, D. C.*

Ceylon Rubber Exports

January 1 to March 31, 1931

To	Tons
United Kingdom	4,224.46
Continent	2,006.03
Other countries in Europe	32.52
Australia	389.15
America	12,390.41
Other countries in America	81.95
Egypt	4.00
Africa	.76
India	8.26
Japan	117.02
Other countries in Asia	3.00
Total	19,257.56
For the same period last year	22,228.90

Annual Exports, 1923-1930

	Tons
For the year 1930	75,602.18
1929	80,219.25
1928	57,825.48
1927	55,355.77
1926	58,799.56
1925	45,697.19
1924	37,351.13
1923	37,111.88

Low and High New York Spot Prices

	June					
PLANTATIONS	1931*		1930		1929	
Thin latex crepe	$0.06¾	@ $0.06¾	$0.12½	@ $0.14¼	$0.21⅛	@ $0.22⅛
Smoked sheet, ribbed	.06⅛	@ .06½	.11¾	@ .13¾	.20	@ .21½
PARAS						
Upriver fine	.07¾	@ .08½	.14	@ .15¼	.21¾	@ .23½
Upriver coarse	.06	@ .06½	.07	@ .07¼	.11½	@ .12½
Upper caucho ball	.06	@ .06½	.07	@ .07¼	.11½	@ .12½

* Figured to June 25, 1931.

Principal Rubber Stocks

Long Tons

	1930			1931			
	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May
Malay Estates	25,663	26,028	25,837	25,056	22,492	21,406	.....
S. S. Dealers	34,479	36,884	39,610	42,986	44,317	41,456	40,069
Other Malay Dealers	12,924	14,523	15,082	17,971	17,735	15,697	.....
Malayan Ports	4,734	4,016	5,569	5,178	3,983	3,401	3,143
Totals	77,800	81,451	86,098	91,191	88,527	81,960	.....
London	77,647	76,887	78,013	82,265	84,736	*86,355	*85,000
Liverpool	38,848	39,718	40,549	44,656	49,094	*52,000	*53,700
Totals	116,495	116,605	118,562	126,921	133,830	*138,355	*138,700
U. S. Inventory	186,069	190,617	201,000	210,611	215,523	224,211	219,405
U. S. Afloat	50,441	51,837	55,288	63,680	63,133	56,700	73,564
Europe Afloat	27,630	24,220	25,980	24,580	21,990	*21,000	.....
Totals	78,071	76,057	81,268	88,260	85,123	*77,700	.....
Grand totals	458,435	464,730	486,928	516,983	523,003	522,226	.....

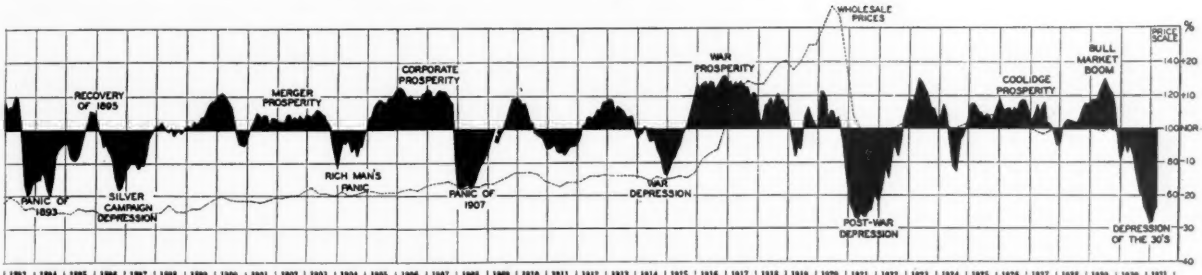
*Estimate.
Compiled by Rubber Division, Department of Commerce, Washington, D. C.

Rubber Varnishes

The two following formulae illustrate the use of rubber as a component of varnish.[1] (1) Six parts of rubber are dissolved in 12.5 parts of turpentine and 15 parts of stand-oil; 30 parts of warm copal varnish are added. (2) Dry rosin and rubber are melted together while liquid zinc oxide is added, followed by copal varnish or a varnish consisting of 50 parts of rosin and 40 parts of alcohol. The mass is milled and thinned with rosin varnish. This varnish is said to be unaffected by acids and water.

[1]L. Schmitt, *Oil Colour Trades J.*, 79, p. 426 (1931).

Activity Since 1854



1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	
+ 6.0	−15.3	− 3.9	− .1	−10.9	+ 1.1	+ 1.1	+10.5	+ .3	+ 2.3	+ 4.3	− 7.1	+ 3.4	+12.6	+11.5	−18.0	− 3.2	+ 8.6	− 5.8	+ 2.5	+ 9.2	− 1.3	−11.8	+12.3	+11.3	+ 1.5	− .5	+11.3	−33.0	−18.6	+ 6.4	+ 4.2	+ 7.8	+ 6.7	+ 2.9	+ .3	+ 8.8	− 6.7	−38.3	Jan.
+ 6.8	−13.0	− 7.7	− 1.3	− 9.3	+ 2.5	+ .4	+10.9	+ 1.6	+ 2.0	+ 2.3	− 3.6	+ 4.0	+12.0	+ 9.4	−17.4	− 2.3	+ 7.2	− 5.2	+ .9	+ 8.5	− .9	− 9.3	+13.5	+12.7	+ 2.6	− 4.1	+10.9	−24.4	−15.4	+ 8.2	+ 7.3	+ 7.6	+ 5.5	+ 4.6	+ 1.9	+ 8.4	− 4.2	−28.0	Feb.
+ 6.6	−12.5	− 8.5	− 4.9	− 9.8	+ 1.1	+ 2.5	+10.1	+ 2.9	+ 2.4	+ 4.8	− 4.1	+ 6.9	+10.4	+ 9.0	−16.9	− 3.4	+ 7.7	− 4.3	+ 1.4	+ 4.9	+ .9	− 8.1	+14.3	+14.1	+ 7.1	− 8.0	+ 9.4	−26.8	−11.3	+11.1	+ 4.9	+ 6.1	+ 6.3	+ 7.3	+ 2.9	+ 9.0	− 7.1	−23.4	Mar.
+10.0	−14.1	− 9.1	− 3.9	−10.0	− 0	+ 1.6	+ 9.2	+ 4.0	+ 4.3	+ 5.9	− 2.3	+ 8.2	+ 8.9	+11.0	−16.7	− 3.5	+ 5.8	− 6.7	+ 3.4	+ 7.0	− .8	− 5.9	+12.7	+12.1	+ 7.5	− 4.9	+ 2.1	−27.0	−14.7	+15.2	− .6	+ 4.0	+ 6.0	+ 4.2	+ 2.3	+11.5	− 4.7		Apr.
+ 9.8	−15.6	− 7.7	− 6.0	−11.6	− .6	+ 2.5	+ 8.0	+ 4.4	+ 4.5	+ 5.5	− 4.3	+ 8.7	+10.2	+11.6	−18.1	− 1.5	+ 2.0	− 7.0	+ 2.5	+ 6.6	− 2.6	− 4.7	+14.2	+14.2	+ 9.3	− 6.0	+ 5.6	−24.9	− 9.5	+13.8	− .7	+ 4.6	+ 4.5	+ 6.8	+ 2.1	+13.1	− 7.5		May
+ 3.5	−19.9	− 8.3	− 6.8	−10.4	+ .6	+ 3.0	+ 8.5	+ 2.5	+ 2.7	+ 4.6	− 6.7	+ 8.3	+ 9.1	+11.1	−17.3	− .6	+ 1.7	− 6.8	+ 2.9	+ 5.7	− 3.4	− 1.4	+14.0	+13.4	+ 6.9	− .2	+ 5.2	−20.2	− 5.3	+12.6	−11.5	+ 3.4	+ 5.3	+ 7.7	+ 1.9	+14.7	−11.3		June
− 5.9	−15.3	− 1.9	− 0.1	−10.6	− 1.7	+ 3.7	+ 1.3	+ 4.4	+ 3.6	+ 4.1	− 4.7	+ 8.0	+ 5.8	+11.2	−15.6	+ 1.8	− 1.3	+ 7.8	+ 4.3	+ 5.1	− 2.7	+ .1	+11.4	+12.4	+ 9.3	+ 4.3	+ 2.6	−24.4	− 3.5	+11.3	−12.7	+ 4.3	+ 5.3	+ 1.6	+ 1.7	+12.6	−15.9		July
−18.3	− 7.7	− .4	−14.9	− 7.4	− .3	+ 6.0	+ 1.3	+ 4.2	+ 2.6	+ 2.3	− 6.0	+ 8.3	+ 9.4	+10.0	−12.8	+ 4.2	+ 1.7	+ 6.3	+ 5.7	+ 2.5	− 5.0	+ 5.4	+15.2	+12.5	+10.5	+ 6.3	+ 3.5	−24.4	− 7.9	+ 8.8	− 7.7	+ 3.8	+ 6.3	+ 1.3	+ 3.2	+11.5	−10.8		Aug.
−19.5	− 6.0	+ 2.5	−17.9	− 2.3	0	+ 7.6	− 4.0	+ 1.1	+ 4.3	+ .9	− 5.1	+ 9.7	+ 8.3	+ 8.3	−11.0	+ 6.9	+ 2.5	+ 5.3	+ 6.6	+ 3.6	− 7.4	+ 5.0	+14.4	+ 9.1	+ 8.5	+ 3.6	− .2	−24.5	− 3.7	+ 6.4	− 2.8	+ 1.7	+ 8.7	+ .3	+ 3.9	+10.3	−10.8		Sept.
−19.1	− 3.2	+ 5.6	−17.3	− 1.1	− 1.1	+ 8.6	− 4.6	+ 3.6	+ 3.3	− 3.7	− 5.0	+ 9.4	+10.5	+ 7.8	−10.0	+ 9.0	+ 2.8	+ 5.1	+ 8.0	+ 3.8	−10.3	+ 7.3	+15.5	+10.8	+ 8.5	+ 2.4	+ 4.0	−30.2	+ 2.6	+ 6.1	− 2.0	+ 4.4	+ 8.5	− 2.0	+ 7.5	+ 6.5	−21.5		Oct.
−16.5	− 4.4	+ 5.3	−14.6	+ .1	− .1	+ 8.6	− 4.7	+ 3.3	+ 2.9	− 7.5	− .6	+10.9	+10.7	− 7.5	− 8.0	+ 8.2	− 4.1	− 4.8	+ 8.3	− .6	−13.5	+10.1	+15.8	+10.6	+ 6.0	+ 1.0	− 12.3	−20.4	+ 5.6	+ 3.8	− .1	+ 7.3	+ 6.3	− 5.0	+ 7.9	− 2.7	−33.6		Nov.
−15.6	− 2.7	+ 4.6	−12.0	+ 1.3	+ 1.0	+ 9.0	− 2.7	+ 2.6	+ 4.5	−11.0	+ .6	+11.6	+11.8	−17.3	− 6.6	+ 9.4	− 5.9	− 4.7	+ 8.3	− 3.0	−13.6	+13.4	+13.9	+ 8.9	+ 6.1	+ .7	− 18.3	−31.7	+ 8.7	+ 2.3	+ 3.8	+ 9.0	+ 2.1	− 4.3	+ 7.0	− 9.2	−38.2		Dec.

series. The 10 series with their effective weights are pig iron consumption 21, blast furnace activity 16, canal freight (New York and Sault Ste. Marie) 12, railroad freight ton miles 10, cotton consumption 9, rail production 9, coal production 8, construction of miles of new railroads 7, locomotive production 6, and ship construction 2. The 10 series combined give results closely similar to those of the production series for the overlap period from 1901 through 1930. The heights of prosperities, and the depths of depressions are closely alike in the two series. The coefficient of correlation for the period is .95. Their average deviations for the period are equal.

When the annual data were determined the monthly data were fitted to them. These monthly data were based on the figures of the business index of the American Telephone & Telegraph Co., and on data for blast furnace activity from 1877 to 1919. Monthly data for bank clearings and for stock prices were used from 1861 to 1877, and those for security and commodity prices from 1854 to 1861. The dashed line represents the changes in wholesales commodity prices. The index used is that of Professor Warren and Professor Pearson (Cornell), recomputed so that the average for 1929 equals 100.

United States Crude and Waste Rubber Imports for 1931 by Months

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Manicobas and Matto Grosso	Totals 1931	Totals 1930	Balata	Miscellaneous	Waste
January ..... *tons*	36,525	206	331	36	..	..	..	37,098	47,362	65	960	38
February	35,749	339	516	40	1	..	..	36,645	43,728	1	580	..
March	38,922	352	1,062	2	..	..	..	40,338	45,430	170	800	..
April	46,034	323	291	..	..	..	..	46,648	49,927	196	908	60
May	30,962	248	508	2	..	..	..	31,720	40,745	78	450	2
Total, five months, 1931..... *tons*	188,192	1,468	2,708	80	1	..	..	192,449	.. ..	510	3,698	100
Total, five months, 1930..... *tons*	220,901	1,592	3,840	232	52	575	..	.....	227,192	576	3,566	393

Compiled from Rubber Manufacturers Association statistics.

Plantation Rubber Crop Returns by Months

Summary of 615 Producing Companies

	Br. N. Borneo (26 Companies)		Ceylon (102 Companies)		India and Burma (21 Companies)		Malaya (338 Companies)		Netherlands East Indies—Java (60 Companies)		Netherlands East Indies—Sumatra (60 Companies)		Miscellaneous (8 Companies)		Total (615 Companies)	
	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index
1929 Total	5,868	.	24,489	..	6,737	.	149,202	....	31,510	....	48,382	.	2,169	..	268,357	....
Monthly average	489	100.0	2,041	100.0	562	100.0	12,434	100.0	2,626	100.0	4,032	100.0	181	100.0	22,363	100.0
1930																
January	523	107.0	2,280	111.7	652	116.0	14,037	112.9	2,999	114.2	4,526	112.3	223	123.2	25,240	112.9
February	455	93.0	1,206	59.1	162	29.9	11,518	92.6	2,703	102.9	3,699	91.7	139	76.8	19,882	88.9
March	392	80.2	864	42.3	583	103.7	11,113	89.4	2,837	108.0	3,366	83.5	163	90.1	19,318	86.4
April	458	93.7	2,357	115.5	734	130.6	11,729	94.3	3,028	115.3	3,733	92.6	195	107.7	22,234	99.4
May	44	9.0	204	10.0	122	21.7	1,508	12.1	61	2.3	1,169	29.0	135	74.6	3,243	14.5
June	532	108.8	1,884	92.3	530	94.3	13,083	105.2	3,416	130.1	4,353	108.0	210	116.0	24,008	107.4
July	569	116.4	2,799	137.1	500	89.0	14,508	116.7	3,197	121.7	4,632	114.9	221	122.1	26,426	118.2
August	543	111.0	2,507	122.9	528	94.0	14,957	120.3	2,445	93.1	4,585	113.7	206	113.8	25,771	115.2
September	529	108.2	2,216	108.6	529	94.1	13,869	111.5	2,548	97.0	4,446	110.3	191	105.5	24,328	108.8
October	519	106.1	1,987	97.4	781	139.0	13,718	110.3	2,745	104.5	4,263	105.7	213	117.7	24,226	108.3
November	503	102.9	2,375	116.4	823	146.4	13,656	109.8	2,905	110.6	4,223	104.7	212	117.1	24,697	110.4
December	519	106.1	2,445	119.8	855	152.1	14,041	112.9	2,954	112.5	4,764	118.1	218	120.4	25,796	115.4
Totals	5,586	....	23,124	....	6,799	. ..	147,737	....	31,838	. ..	47,759	....	2,326	....	265,169	....
Monthly average	466	95.3	1,927	94.4	567	100.9	12,311	99.0	2,653	101.0	3,980	98.7	194	107.2	22,097	98.8
1931																
January	473	96.7	1,776	87.0	397	70.6	13,006	104.6	3,020	115.0	4,324	107.2	225	124.3	23,221	103.8
February	365	74.6	1,138	55.8	160	28.5	11,551	92.9	2,631	100.2	3,721	92.3	130	71.8	19,696	88.1
March	377	77.1	1,062	52.0	510	90.7	11,387	91.6	3,168	120.6	4,173	103.5	174	96.1	20,851	93.2
April	356	72.8	1,706	83.6	672	119.6	10,464	84.2	3,066	116.8	3,729	92.5	189	104.4	20,182	90.2
May	425	86.9	1,429	70.0	649	115.5	11,675	93.9	3,236	123.2	4,072	101.0	194	107.2	21,680	96.9
Five Months Ended May																
1931	1,996	. ..	7,111	....	2,388	. ..	58,083	....	15,121	. ..	20,019	....	912	....	105,630	....
1930	1,872	. ..	6,911	....	2,253	....	49,905	....	11,628	. ..	16,493	....	855	....	89,917	....
1929	2,247	. ..	8,167	. ..	2,682	....	57,292	...	13,636	. ..	18,198	....	780	....	103,002	....

NOTE. Index figures throughout are based on the monthly average for 1929 = 100. Issued June 11, 1931, by the Commercial Research Department, The Rubber Growers' Association, Inc., London, England.

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	March, 1931		Twelve Months Ended March, 1931	
UNMANUFACTURED	Pounds	Value	Pounds	Value
Rubber, gutta percha, etc.	6,747,761	$558,583	59,522,523	$6,768,034
Rubber, recovered	1,297,900	60,934	13,334,300	661,485
Rubber and gutta percha scrap	340,900	12,460	3,714,900	110,558
Balata	2,347	1,011	36,608	13,227
Rubber substitute	17,000	2,196	592,300	81,485
Totals	8,405,908	$635,184	77,200,631	$7,634,789
PARTLY MANUFACTURED				
Hard rubber sheets and rods	3,582	$1,759	55,264	$26,004
Hard rubber tubes	.....	726	.....	4,557
Rubber thread not covered	69,760	58,368	294,721	250,180
Totals	73,342	$60,853	349,985	$280,741
MANUFACTURED				
Belting	.....	$10,236	.....	$128,750
Hose	.....	14,819	.....	136,209
Packing	.....	7,715	.....	67,248
Boots and shoes.....*pairs*	1,741	2,584	20,395	38,930
Clothing, including waterproofed	.....	35,032	.....	284,508
Gaskets	.....	.....	.....	14,570
Gloves	.....	2,817	.....	20,329
Hot water bottles	.....	4,102	.....	32,967
Tires, bicycle .....*number*	8,398	3,723	39,766	18,201
Pneumatic .....*number*	8,268	49,635	41,243	334,890
Inner tubes .....*number*	3,206	2,784	17,839	21,422
Solid for automobiles and motor trucks.....*number*	54	1,075	890	21,555
Other solid tires	.....	5,555	.....	29,416
Mats and matting	.....	5,850	.....	86,330
Cement	.....	9,902	.....	79,778
Golf balls .....*dozen*	8,910	24,601	45,141	117,351
Heels .....*pairs*	108,281	4,094	1,173,812	38,203
Other rubber manufactures	.....	135,735	.....	1,178,550
Totals	.....	$320,259	.....	$2,649,207
Totals, rubber imports	.....	$1,016,296	.....	$10,564,737

Exports of Domestic and Foreign Rubber Goods

	Produce of Canada Value	Re-exports of Foreign Goods Value	Produce of Canada Value	Re-exports of Foreign Goods Value
UNMANUFACTURED				
Waste rubber	$4,938	.....	$72,553	.....
MANUFACTURED				
Belting	$33,869	.....	$438,556	.....
Canvas shoes with rubber soles	440,643	.....	3,577,980	.....
Boots and shoes	120,133	.....	2,598,477	.....
Clothing, including waterproofed	5,300	.....	36,489	.....
Hose	18,067	.....	205,681	.....
Tires, bicycle	518	.....	4,130	.....
Pneumatic	662,327	.....	10,508,716	.....
Inner tubes	91,354	.....	1,239,190	.....
Solid	511	.....	17,042	.....
Other rubber manufactures	169,659	$2,177	2,363,971	$40,546
Totals	$1,542,381	$2,177	$20,990,232	$40,546
Totals, rubber exports	$1,547,319	$2,177	$21,062,785	$40,546

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Charing Cross, London, S.W.1, England, gives the following figures for May, 1931:

Rubber Exports

Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

	May, 1931	
To	Sheet and Crepe Rubber Tons	Latex Concentrated Latex and Revertex Tons
United Kingdom	5,690	30
United States	31,014	57
Continent of Europe	3,797	21
British possessions	1,142	1
Japan	2,133	2
Other countries	394	..
Totals	44,170	111

Rubber Imports

Actual Imports by Land and Sea

	May, 1931	
From	Dry Rubber Tons	Wet Rubber Tons
Sumatra	492	5,189
Dutch Borneo	442	2,432
Java and other Dutch Islands	55	19
Sarawak	848	21
British Borneo	153	17
Burma	106	13
Siam	265	148
French Indo-China	202	8
Other countries	62	7
Totals	2,625	7,854

Changes in Freight Rates

The new freight rate proposals on rubber scrap have been made by the railways for approval by the Interstate Commerce Commission to become effective not later than December 3, 1931.

The following table shows the present and proposed rates on rubber scrap from representative points to points where reclaimers are located.

Scrap Rubber

To	Akron, Ohio		Buffalo, N. Y.		Butler, N. J.		Mishawaka, Ind.		Naugatuck, Conn.	
From	L.C.L.	C.L.	L.C.L.	C.L.	L.C.L.	C.L.	L.C.L.	C.L.	L.C.L.	C.L.
Boston, Mass.										
Pres.	47	33½	40	28½	38	28½	62	44½	33½	18½
Prop.	63	35	54	30	42	23	74	40	34	18
New York, N. Y.										
Pres.	47	33½	37½	26½	21½	16	62	44½	28	15½
Prop.	58	32	51	28	22	12	71	39	26	14
Syracuse, N. Y.										
Pres.	37½	22½	25½	16	34	25	47½	31	36½	28½
Prop.	47	26	33	18	41	23	58	32	35	19
Buffalo, N. Y.										
Pres.	37½	21	..	..	37½	26½	47½	26½	40	28½
Prop.	38	21	..	..	48	26	52	29	51	28
Philadelphia, Pa.										
Pres.	45	31½	37½	26½	28½	21½	60	42½	31	27
Prop.	54	29	51	28	34	18	68	37	37	20
Scranton, Pa.										
Pres.	37½	27	37½	26½	32	27½	50½	35½	38	28½
Prop.	49	27	41	23	30	17	64	35	46	25
Pittsburgh, Pa.										
Pres.	29½	16½	38	21½	39½	28½	45½	28½	42½	30½
Prop.	31	17	40	22	52	29	51	28	58	32
Baltimore, Md.										
Pres.	44	30½	37½	26½	34	22½	59	41½	42½	30½
Prop.	51	28	51	28	41	23	65	35	44	24
Cleveland, O.										
Pres.	20½	11½	35½	20	47	33½	39½	22	51	35½
Prop.	20	11	36	20	58	32	41	23	58	32
Detroit, Mich.										
Pres.	36½	20½	38	21½	51½	37	34½	19½	55½	39
Prop.	36	20	40	22	62	34	37	20	63	34
Indianapolis, Ind.										
Pres.	40½	22½	48½	27	61½	44	32	18	65½	46
Prop.	44	24	54	30	71	39	35	19	73	40
Chicago, Ill.										
Pres.	42½	24	49	27½	66	47½	26½	15	70	49½
Prop.	48	26	57	31	76	42	28	15	76	42
St. Louis, Mo.										
Pres.	52	29	61½	34½	77	55½	42½	24	81	57½
Prop.	58	32	69	38	84	46	47	26	85	47

World Rubber Absorption—Net Imports

Long Tons

	Calendar Years		1931		
CONSUMPTION	1929	1930	Feb.	Mar.	Apr.
United States	472,000	376,107	29,049	33,076	33,613
United Kingdom	72,023	74,760	9,690	5,425	4,410
NET IMPORTS					
Australia	15,886	5,354	495	435	.....
Austria	3,324	2,365	241	148	293
Belgium	9,445	10,740	785	862	.....
Canada	35,453	28,793	1,927	3,012	2,070
Czechoslovakia	4,650	4,532	366	507	.....
Denmark	799	1,147	111	66	107
Finland	976	1,262	24	44	134
France	59,342	68,503	4,510	4,386	.....
Germany	49,078	45,488	3,374	3,545	3,054
Italy	17,169	18,570	1,393	418	528
Japan	34,284	32,731	3,264	2,323	3,478
Netherlands	3,022	2,924	157	346	333
Norway	813	1,143	46	74	39
Russia	12,626	16,229	1,022	2,372	.....
Spain	2,400	2,400	201	392	208
Sweden	3,857	4,414	295	216	215
Switzerland	653	808	123	77	80
Others estimated†	7,000	7,200	*600	*600	*600
Totals	804,800	705,470	57,673	58,324	.....
Minus United States	472,000	376,107	29,049	33,076	33,613
Total foreign	332,800	329,363	28,624	25,248	.....

*Estimate to complete table. †Includes Argentina. Brazil, Chile, China, Cuba. Egypt, Estonia, Hungary, Latvia, Mexico, Poland. Portugal, and Union of South Africa.

Compiled by Rubber Division, Department of Commerce, Washington, D. C.

London Stocks, April, 1931

			Stocks April 30		
LONDON	Landed Tons	Delivered Tons	1931 Tons	1930 Tons	1929 Tons
Plantation	6,492	4,246	86,881	74,590	31,226
Other grades	..	..	50	43	81
LIVERPOOL					
Plantation	*4,536	*1,751	*51,879	*23,849	*4,590
Total tons, London and Liverpool	11,028	5,997	138,810	98,482	35,897

*Official returns from the recognized public warehouses.